*Conservation Commissioner Robert S. Maestri Drafted Mayor of New Orleans, Conservation Center of the South.* (See Page 2)

# Louisiana
# Conservation
# REVIEW

*Published Quarterly by the*
DEPARTMENT OF CONSERVATION

OCTOBER
1936

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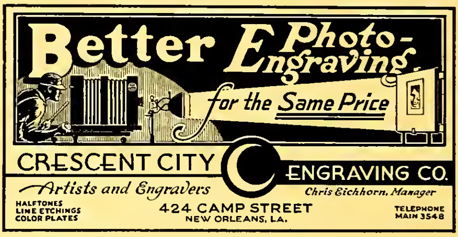
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*Published by the*
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## SHRIMP INVESTIGATIONS

FIVE and a half years ago there was initiated a cooperative shrimp investigation participated in by the Bureau of Research of the Department of Conservation and the Bureau of Fisheries of the United States Department of Commerce. Cooperating also in a certain measure were the states of Texas and Georgia.

Shrimp constitute the basis of greatly the most important fishery in the entire south. Louisiana produces almost one-half of all the shrimp taken in the United States. Last year the production in Louisiana waters reached the amazing volume of fifty-three million pounds.

Shrimp of three species occur in the marine commercial catch in Louisiana, the so-called Lake Shrimp, *Penaeus setiferus;* the Grooved Shrimp, *Penaeus brasiliensis;* and the Sea Bob, *Xiphopenaeus kroyeri.* Of these the Lake Shrimp is overwhelmingly the most important composing in excess of ninety-five percent of the commercial catch.

Sea shrimp, at the time of the initiation of this cooperative investigation, were of all commercial marine products the least understood. Nothing sure was known concerning their spawning, their migrations, the duration of their life, the character of their life history. Today as a result of these cooperative investigations the major elements of the shrimp life history have become clearly understood. The discoveries include some quite surprising results. The shrimp, believed by many to be non-migratory, have, on the contrary, been shown by tagging experiments to be quite motile. In some localities tagged specimens have moved well over two hundred miles in less than three months. The life history is highly peculiar. Unlike many other crustacea such as crabs, crayfish and lobsters, which carry their eggs attached to themselves until they are hatched, the sea shrimp casts out its minute eggs freely into the water. There they float and develop as minute larvae, so minute indeed that twenty-four of them could be placed on the head of an ordinary pin. Minute though they are, these young shrimp are endowed with a surprising ability of growth. Subject to the manifold vicissitudes of their marine world, they flourish and prosper in spite of their many enemies and contribute a vast volume of valuable food to the Nation.

The results of the shrimp investigation have now given us a clear-cut picture of the major events of the shrimp life history. The eggs shed into the sea are spawned offshore yet by some strange quirk of adaptation the young do not develop at sea but enter estuaries, bayous, bays, and other sheltered waters there to undergo their early growth. Grown in stature they again take themselves to sea to spawn and disappear from the customary fishing grounds. The shrimp that form the great body of the autumn fishery are shrimp spawned the previous spring.

The ascertained facts concerning the life history of the shrimp form the first adequate basis upon which proper conservation measures can be designed.

Elsewhere in this issue of the *Louisiana Conservation Review* will be found two contributions relating to a somewhat controversial subject namely "The Effects of Shrimp Trawling Operations on Sea Fish". There will be found a great deal of data the interpretation of which is developed by the two contributors. These views by no means necessarily express the editorial opinion of the Conservation Review. The facts, tediously and accurately gathered, are here presented. A careful examination of them will enable the reader to come to his own proper opinion.

The articles here referred to are incidental by-products of the shrimp investigation. The results of these researches, detailed and convincing, have already appeared in the form

(Continued on Page 56)

## TERMITES

ELSEWHERE in this issue of the *Louisiana Conservation Review* appears an able discussion of termites and their control. Dr. Thomas Elliott Snyder is the pre-eminent authority on the subject of American termites. He has very kindly given in this paper the fruitful results of some of his investigations. Dr. Snyder is the author of the volume "Our Enemy the Termite", one of the most complete and satisfactory accounts of these peculiar insects.

Termites are widespread insects and many of the popular ideas concerning them are quite erroneous. Dr. Snyder well points out that much needless alarm is felt concerning termites and that the adequate measures to combat them and prevent the destruction of property are both relatively simple and relatively inexpensive.

# Robert S. Maestri Becomes Conservation Mayor of New Orleans, Conservation Center of the South

WHEN in May of 1928 Governor Huey Pierce Long, youngest Governor in the history of Louisiana, took the helm of the State, he realized that one of the key positions in the efficient administration of the State's affairs and one of the most effective aids and agents in carrying out his program in the proper reconstruction of the State during the period of great national depression would be the Commissioner of Conservation.

Be it remembered that Huey Pierce Long's fundamental thought of making Louisiana a modern State depended upon the proper administration and utilization of its natural resources. In this he carried out President Woodrow Wilson's immortal statement:

"These United States cannot fail. With their God-given natural resources, through their proper conservation and utilization our people will never suffer want."

Further, believing in the also immortal principles of President Theodore Roosevelt:

"The conservation of our natural resources and their proper use constitute the fundamental problem which underlies almost every other problem of our national life."

With the acumen so eminently characteristic of Governor Long in his estimate of men and public affairs, he chose Colonel Robert S. Maestri as his Commissioner of Conservation.

Commissioner Maestri was most unwilling to assume this arduous office. A business man, most notably successful in his manifold personal interests, it was only upon his realization that the welfare of the State evidently required his services that he at last consented to Governor Long's wishes and assumed what was, in the face of the depression's financial condition, a herculean task.

Commissioner Maestri came to a Department whose financial story was one of lamentable deficits. The natural resources of Louisiana were of unexcelled richness. It required, as Governor Huey P. Long keenly realized, the proper administration of these resources to gain for Louisiana her just heritage. Commissioner Maestri brought to the Department of Conservation and to the State of Louisiana the very administrative abilities that were essential. His enviable record has won the recognition of states throughout the entire Union and has been in great part responsible for the fact that Louisiana in many respects has suffered less from the depression than have the other states and has rebounded from these depressed conditions into a new prosperity.

Commissioner Maestri now passes to the administration of the affairs of the City of New Orleans with behind him a great task well done and before him a great task to do. It is the complete conviction of those who know him that this task he will likewise accomplish with high distinction and for the public good.

### ADMINISTRATION AND ACCOUNTING

The Department under the administration of Commissioner Maestri always remaining within its budget and carrying a substantial bank balance. At all times receiving the commendation of the State Supervisor of Public Accounts as evidenced by his comments:

"And I was pleased to note that all disbursements were supported by good vouchers, and the accounts and records found in excellent shape."

Establishing a system of economy and saving and utilizing these savings in projects of permanent benefits.

Complete reconstruction of each division and enlarging and broadening their activities which has required at least three-fourths more floor space than formerly maintained by the Department.

Full cooperation with federal agencies, universities and colleges in Louisiana, through the Department's Divisions of Enforcement, Fisheries, Forestry, Minerals, Research and Wildlife.

### BUREAU OF EDUCATION

The Bureau of Education has continued and extended its effective and instructive services designed to reach every man, woman and child in Louisiana.

Commissioner Maestri in 1930 established at 237 Royal Street a conservation museum that since its initiation has grown into an important educational institution.

Carefully prepared and labelled collections of many thousands of specimens cover all phases of Louisiana's natural resources. Wildlife (including birds, fur-bearing and other mammals), fresh and salt water fisheries, oysters, shrimp, trees, forest products and minerals (including salt, sulphur, oil, etc.) are all represented in a vivid and impressive way by orderly, well exhibited collections. Visitors from all parts of the State, from every other state in the Union and from throughout the entire world have studied and enjoyed the exhibits and signed the Museum register. Over seventy-five well mounted specimens of the larger mammals and over seven hundred and seventy-five beautifully natural specimens of birds form but a small part of the Museum's educational displays.

A competent staff explain the exhibits and give illustrated lectures on Louisiana's natural resources. Schools attend, by appointment, special educational lectures. A collection of original motion pictures, both silent and sound, depicting Louisiana's natural resources are used as aids in disseminating valuable information. This work, instituted by Commissioner Maestri, expanded, and is accomplishing a great work.

In addition the Museum staff has carried its lectures, together with travelling exhibits, to other schools throughout the State, and has provided impressive exhibits for various parish fairs.

The Conservation Museum of the Department has been expanded and its collections greatly increased. This Museum, the first state-owned conservation museum in the nation, is unique in its character. Free to the public at all times, it presents orderly, well-labelled and carefully prepared exhibits covering the wildlife, fur resources, resources of minerals and mines, forestry resources, fisheries resources and the resources of marine life. Especially attractive to the public are the rich and well-mounted collections of the birds and mammals of Louisiana.

The motion picture service presents free of charge exhibits of talking and silent pictures which tell more effectively than words the story of our natural resources. Wild birds, forestry, the shrimp fishery, wildlife, the activities relating to the use of mineral resources and many other subjects are presented in a vivid and memorable fashion.

These motion pictures, preceded by lectures on Louisiana's natural resources, serve to compress into a brief space a wealth of knowledge of Louisiana's riches. A staff of competent lecturers is on hand at all times to explain the exhibits to visitors.

The popularity of the Bureau of Education's work in the Museum is demonstrated by the constant stream of interested visitors coming from all states of the nation and from many foreign lands.

The increasing popularity of New Orleans as a convention city has brought to the Museum an extraordinarily wide variety of professional and business groups from all parts of the United States.

Probably most valuable of all in terms of ultimate effect is the work done with students of primary, secondary and higher educational institutions. The measure of the success of this activity is well indicated by the eager and attentive reception that it enjoys.

The Bureau of Education, aside from carrying on its lecture work throughout a great number of schools of the State, has been interesting itself in carrying on its educational campaign at state and parish fairs. These fairs serve as an exceptional opportunity to present to the general public the scope and purpose of the Department of Conservation.

(Continued on Page 47)

# Seismic Prospecting in Exploration for Oil

By **V. GAVRILOVICH GABRIEL[1] Sc.D.**

At the present time no oil man will question the usefulness of geophysics in prospecting for oil in the Gulf Coast. However, to many landowners, lease and royalty owners and buyers, and others interested in oil exploration developments, the basic principles of Seismic Prospecting are still a mystery. The main purpose of this article is to explain for the non-technical man, who has had little or no training in mathematics and physics, the principles[2] employed in Seismic Prospecting.

Everybody has had the experience of throwing pebbles into a quiet river or lake. You remember that the impact of the pebble hitting the surface of the water generated circular ripples or waves. The wave front of these ripples or waves was propagating outward with a certain uniform velocity until it was damped by friction. Similarly, these same ripples, so called elastic waves, are passing underground when a charge of dynamite is exploded near the surface of the earth. The elastic waves in a solid body are not circular but spherical in shape and are propagating with a certain speed which varies with the density and the elastic constant of the formation or material through which the wave is passing. The velocities of propagation of disturbances through different media are given in the following table:

VELOCITY OF PROPAGATION OF ELASTIC WAVES

| Material | Longitudinal waves in Km. p. s.[3] Average | Maximum | Minimum |
|---|---|---|---|
| Sandstone | 1.8 | 2.2 | 1.4 |
| Limestone | 5.0 | 5.7 | 3.8 |
| Sedimentry Rocks in General | 3.6 | 5.9 | 1.2 |
| Volcanic Rocks | 2.8 | 4.2 | 1.4 |
| Igneous Rocks | 5.3 | 8.0 | 2.1 |
| AGE | | | |
| Tertiary | 2.1 | 3.0 | 1.2 |
| Alluvium Sed. | 2.2 | 3.6 | 1.4 |
| Mesozoic | 3.4 | 5.9 | 1.8 |
| Paleozoic | 5.2 | 8.8 | 2.1 |
| Archean | 5.6 | 7.0 | 4.1 |

| Material | Km. per Sec. | Ft.[4] per Sec. |
|---|---|---|
| Air at 0° C. | 0.33 | 1086 |
| Air at 100° C. | 0.35 | 1166 |
| Water | 1.4 | 4700 |
| Rock Salt | 4.8 | 16000 |
| Granite | 6.9 | 23000 |

NOTE:
[3]Kilometers per second.
[4]Figures are approximate.

Now going back to the wave front generated by a pebble thrown into the water, you remember that as long as the water surface was clear of dirt, leaves, sticks, and the like, the wave front was circular.[5] However, any leaf or foreign material floating on the water would disturb the velocity of propagation of the wave front at this particular spot and right behind the leaf the ripples would be irregular in form.

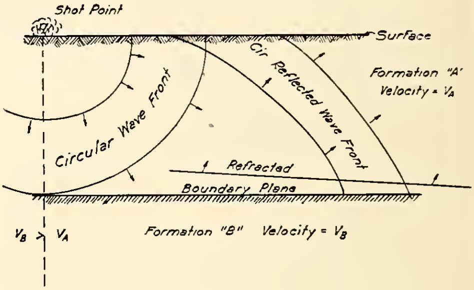

Fig. 1.

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*The author wishes to thank Mr. Clarence P. Dunbar, Consulting Geologist, Houston, Texas, for many helpful suggestions and criticisms in the preparation of the manuscript. He also wishes to thank Mr. J. A. Gerson, Houston, Texas, for making the drawings.

[1] Consulting Geophysicist, Second National Bank Building, Houston, Texas.

[2] Some publications containing a well rounded discussion of geophysics are: "Methods of Practical Geophysics" by R. Ambronn, "Handbook of Geophysics" (in German) by Beno Gutenberg, "Geophysical Methods of Prospecting" by C. A. Heiland, and "Applied Geophysics" by A. S. Eve and D. E. Keyes. Some of the authors who have made notable contributions to the theory and practice of Seismic Prospecting are: Adler, Allen, Barton, Blaw, Born, Buwalda, Don Leet, Ewing, Faust, Gabriel, Goldstone, Gutenberg, Heiland, Kannerstine, La Rue, Lester Macelwane, McCollum, Mertin, McDermott, Karcher, Petty, Rieber, Roman, Rosaire, Rutherford, Salvatori, Slichter, Pautsch, Pearson, Pugh, Vaughann, Wilson, Wood, Weatherby and others in the United States. Space does not permit the listing of numerous authors abroad who have made notable contributions to the theory and practice of Seismic Prospecting.

[5] The word circular should read spherical if the concept is considered in all three dimensions. However, for the sake of simplicity, the concept is dealt with in two dimensions, and hence, the word circular is used.

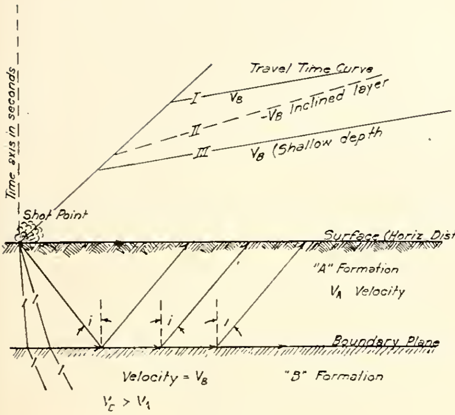

Fig. 2.

The same conditions exist underground when the wave front of a disturbance strikes the boundary plane between two formations of different velocity. Further, part of the energy carried in the wave front after reaching the boundary plane (figure 1) will be reflected and part of it will be refracted back to the surface of the ground. Hence, if we assume a dynamite explosion at the shot point, located in Formation A and having a Velocity Va, the explosion will generate a spherical wave front propagating in the medium A with the Velocity Va in kilometers per second and after reaching the boundary plane the initial wave front will generate a circular reflected wave advancing toward the surface with a Velocity Va and a straight refracted wave advancing with the same Va Velocity upward.

It is clear from the sketch that the arrival time of the reflected and refracted waves at the surface will depend on the thickness of the "A" bed and the Va and Vb velocities. In other words the evaluation of the travel time of the reflected and refracted waves should give some clues to underground conditions. These two distinct types of wave fronts are responsible for the development of two distinct methods of Seismic Prospecting,—the refraction and reflection methods.

Seismic Prospecting was first successfully applied in the United States by Mintrop in the early 1920's. Shortly after Mintrop's success it was taken up by many mining and oil companies, consulting companies, and scientific institutions and organizations. The refraction method was used to a greater extent until 1930. However, recently the reflection method is used to a greater extent because of its cheapness and greater speed in obtaining certain seismic data.

The refraction method of prospecting is based on the comparison of the arrival times of refracted wave fronts. In seismic literature and in the study of data obtained by Seismic Prospecting it is a common practice to apply the concept of the so called seismic rays. A seismic ray is a straight line drawn from the center of the explosion in any direction in the same formation. These straight lines are the trails for the flow of elastic energy. The study of the flow of energy along these seismic rays gives a complete picture of the propagation of the disturbance.

Further, if we investigate the flow of energy along the seismic rays when the explosion takes place at the shot point, the particles of matter situated along the seismic rays will start to vibrate and thus generate two types of vibrations, those along and those perpendicular to the seismic ray. Both types of vibrations will be propagated along the seismic rays with a different speed and are nothing else but elastic waves.

The propagation of these elastic waves along the imaginary seismic rays can be expressed in terms of density and two elastic constants. The velocity of propagation of the fastest, so called, "P" or longitudinal waves vibrating along the seismic ray may be expressed by a formula:

$$\text{Vp (velocity)} = \sqrt{\frac{K + 4/3\ n}{p}}$$

Where p = density
K = modulus of incompressibility, that is measuring the resistance to the force of compression.
n = modulus of rigidity, that is measuring the resistance to the change of form of material.

Now if we assume (see figure 2) that the

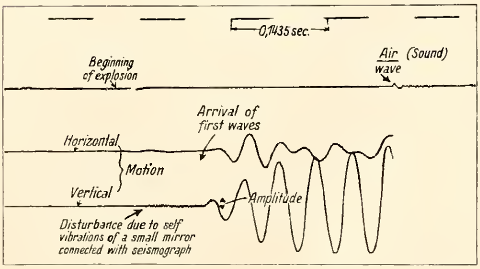

Fig. 3.

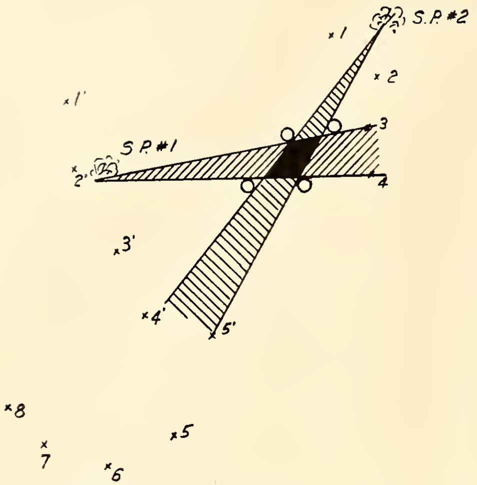

**Fig. 4.** **Explanation:**
SHOT POINT 1. Detection Stations: 1, 2, 3, 4, 5, 6, 7, 8.
HIGH VELOCITY ZONE, 3-4.
SHOT POINT 2. Detection Stations, 1, 2, 3, 4, 5.
HIGH VELOCITY ZONE, 4-5.
SALT DOME AREA, 0000.

upper formation A with a longitudinal velocity of propagation equal to Va and the lower formation B with a velocity equal to Vb, and then explode a charge of dynamite at the shot point (S. P.), the energy will be carried along the seismic rays in all directions until it reaches the boundary plane.

At the boundary plane the seismic ray will pass into the second formation with a certain change of direction as the seismic ray 1, 1. According to Gutenberg's conception for any two formations of different velocity, there is a certain seismic ray which after reaching the boundary plane will be propagated along this boundary plane. In addition to its propagation along the boundary plane this seismic ray will generate elastic energy or new seismic rays directed toward the surface. The only condition for this ray is:

$$\text{Sin } i = \frac{\text{Va}}{\text{Vb}}$$

Where i is the angle of incidence of the seismic rays.

These new seismic rays reach the surface and are detected by special instruments, so called, seismographs or detectors. Each seismograph or detector records photographically (see figure 3) the time of the explosion, the arrival of the first elastic waves, and the travel time of energy along the seismic rays.

After computing the travel time of the energy at many detector points and plotting them (figure 2) in scale we are able to evaluate the velocities Va and Vb and the thickness of the "A" formation from the so called travel time curves. The line Vb which is nothing but the velocity of propagation of an elastic disturbance in the "B" formation will be on a lower level in figure 2 for more shallow depths, provided we are dealing with horizontal formations. For an inclined formation, that is for formation "B" dipping at a certain angle the plotting of travel times of energy obtained from the records will yield only an apparent velocity, which will be either larger or smaller than Vb, the velocity of propagation of energy in the underlying "B" formation. By shooting in the opposite directions the real velocities and the angles of dip can be determined.

There are many different types of instruments used in the refraction method; some of them utilize mechanical principles, some magnetic, electromagnetic, quartz crystals, torsion principles, and the like, nevertheless all of them have many points in common. They are all chiefly interested in the arrival of the first waves which are detected by the instruments, magnified or amplified, and finally recorded on photographic paper or a seismogram. Prior to 1926 very little attention was paid to the arrival of the later seismic rays or energy.

Until 1930 the refraction method was widely used, in geophysical exploration in the Gulf Coast, for the detection of salt domes of shallow and intermediate depth. A very effective and rapid method of refraction work for the exploration of salt domes is called "fan shooting". In this form of shooting the detector points are situated on the periphery of an irregular curve, from five to seven miles in radius. The shot point is at the center of that

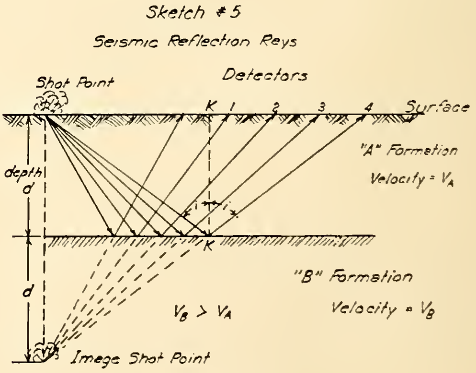

Fig. 5.

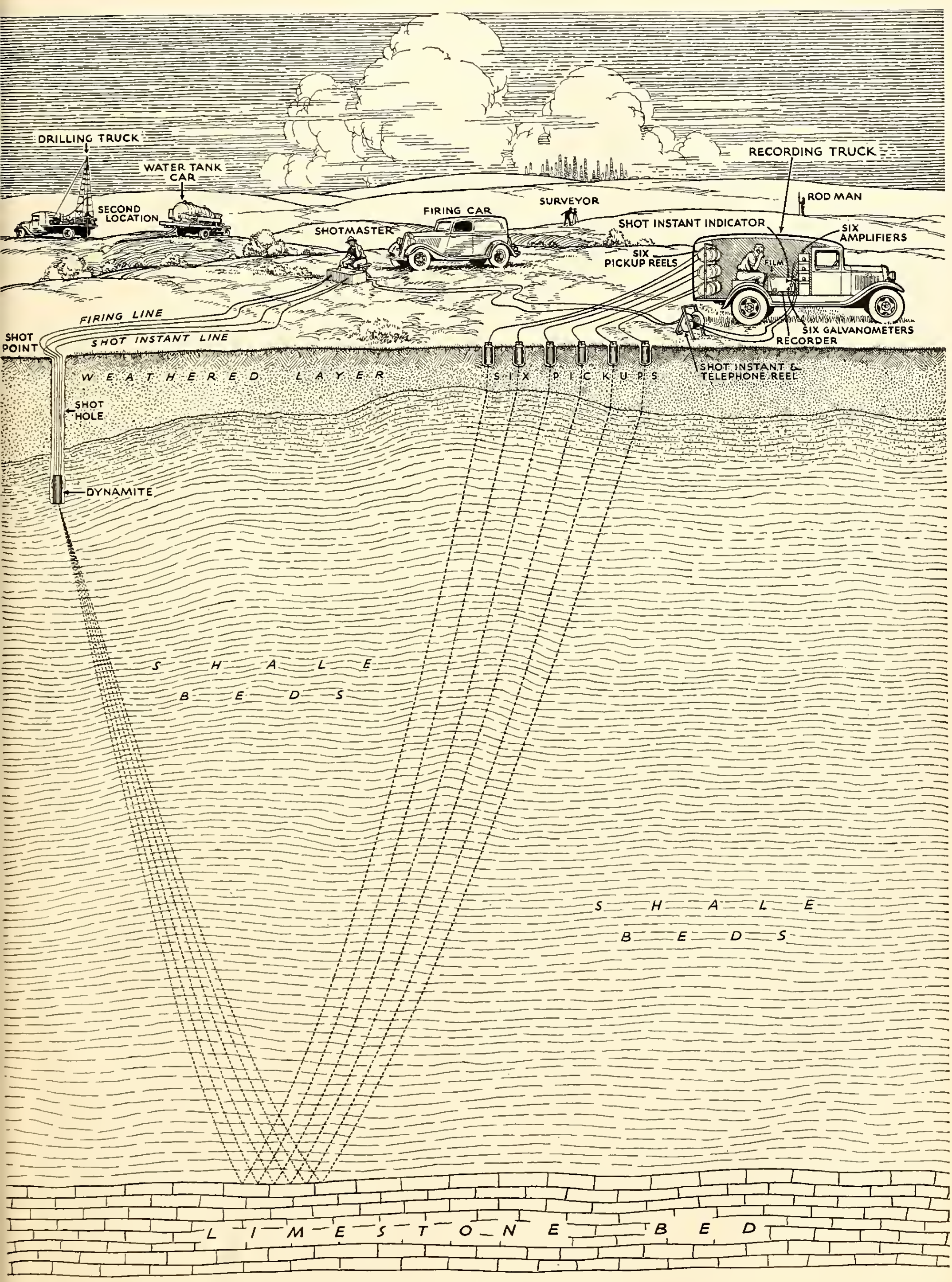

Fig. 6. Schematic diagram showing field procedure in reflection mapping and wave travel beneath the surface. (Courtesy of the American Askania Corporation, Houston, Texas.)
]]>

circle. The over-all travel times of the first elastic waves are computed and plotted against the horizontal distance in a log.-log. manner to obtain a smoother time velocity curve. The high velocities of propagation of elastic waves at certain detector points indicate the presence of high velocity beds or salt domes somewhere in an interval between the shot point and the detectors. A second shot point and the second "fan shooting" usually gives a more definite location for a dome underground.

The reflection method is based on the detection of the reflected waves. As was mentioned before energy is propagating along a seismic ray with a certain speed, let us say Va, for the "A" formation, which will remain the same until the seismic ray hits the boundary plane separating two formations of different velocities. A seismic ray after hitting the boundary plane at an angle of incidence equal to "i" will be deflected toward the surface. Its angle of deflection will be equal to the angle of incidence.

The construction of the paths of seismic reflected rays is rather simple and is shown in figure 5. Now, for the purpose of explanation, we assume two formations A and B, with their respective velocities of propagation equal to Va and Vb and that the thickness of the "A" formation is equal to "d". We know that after the dynamite explosion at the shot point the seismic rays will carry energy with the velocity Va toward the boundary plane and after hitting the boundary plane the seismic rays will be reflected back to the surface. In other words the boundary plane acts like a mirror. Hence, by the application of the laws of reflection of light from a mirror, we can construct the paths of the reflected seismic rays by connecting a detector station with an image point, which is an imaginary point located on a perpendicular to the boundary plane at distance from the shot point equal to 2d, where d is the thickness of the first upper layer.

It is clear that the deeper the boundary plane is located the more time is taken by the energy to travel along its seismic path or ray from the shot point to the detector station. Mathematically, it can be expressed for any detector as:

$$\frac{Xn}{4}\ d^2 = \frac{Tn^2}{4}\ Va^2$$

Where Xn = horizontal distance to any detector measured by a surveyor.

d = depth of the boundary plane —unknown.

Tn = travel time of reflected energy computed from a detector record.

Va = velocity in A formation—unknown.

Theoretically the depths and velocities can be computed from the study of the detector records. However, practically it is considered a rather unreliable method, and usually the evaluation of the so called, overall-average-velocities from deep well shooting are used for the determination of depths in reflection prospecting.

There are many types of instruments used in reflection seismic prospecting such as magnetic, electromagnetic, and quartz crystal principles. However, all of these instruments are based on using a detector to detect reflected energy, an amplifier to amplify and filter the elastic waves, and a photographic recorder. Many of the essential details used in the construction of reflection instruments are not known to the general public.

The geologist is well acquainted with the poorly consolidated and irregular thickness of the alluvial and soil formations. From the geophysical viewpoint they represent formations which give slow and irregular velocities of propagation of elastic waves. A reflection seismologist will make grave errors in his determinations of depths and dips of underground formations if the velocity and depth of the uppermost "weathering layer" is not taken into consideration.

The data obtained by reflection Seismic Prospecting are given either in the form of profiles and seismic logs or in underground contours drawn on a certain key horizon. These data are used in the oil industry to detect favorable oil structures—anticlines, fault zones, monoclines, salt domes, volcanic plugs, igneous intrusions, etc. However, oil can not be detected directly by Seismic methods.

The Seismic work in Louisiana and Texas is conducted by the oil companies or by numerous consulting geophysical companies.

Sawtelle[6] in one of his articles summarizes the results of Seismic Prospecting for salt domes in Louisiana and Texas as follows:

| Type of Seismic Work | Salt Domes Discovered In | | |
|---|---|---|---|
| Leading to Discovery | Louisiana | Texas | Total |
| Refraction Method | 31 | 14 | 45 |
| Reflection Method | 10 | 14 | 24 |

The American Askania Corporation, Houston, Texas, has courteously allowed the author to use their schematic diagram (see figure 6) showing the field procedure in reflection Seismograph Prospecting.

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[6] Sawtelle, George; "Salt Dome Statistics", A. A. P. G. Bulletin, June 1936, Vol. 20, No. 6, page 728.

# STATE PARKS FOR OUR STATE

## A Discussion of Topographical and Environmental Requisites with a Classification of Holdings

By Carroll L. Wood, Jr.

To interpret properly the meaning of State Parks, it is advisable to point out that the term "State Parks" denotes only one class of holdings which should be improved and administered by a State Parks Commission. The holdings that fall under the classification of "State Parks" are those areas of considerable extent in which are combined either superlative scenic characteristics and a fairly extensive opportunity for active recreation or distinctive scenic character, and exceptional opportunity for active recreation and will comprise the major undertakings of the State Parks Commission of Louisiana. The other classes of holdings mentioned briefly below are by no means considered secondary in a complete system, but their development will be less intense and they will usually be more limited in area than State Parks.

### CLASSIFICATION OF HOLDINGS

### State Recreational Reserves:

State recreation reserves are areas set aside solely for the purpose of supplying opportunity for active recreation, there being no necessity for scenic distinction or large acreage.

### State Monuments:

State monuments are established wholly or dominantly because of their historic archeological or scientific interest with recreation, if permitted at all, of the simplest type.

### State Waysides:

State waysides are those small areas situated along or close to highways, administered by the Highway Commission in cooperation with the State Parks Commission, and designed to provide the highway traveller with locations where he may stop to rest and to picnic, and where he may be somewhat separated from the sight, sound, and smell of highway traffic.

### State Parkways:

State parkways could be defined as an elongated area with a road running through it; the title itself is self-explanatory and these areas

Historical home of Louis Arceneaux (character Gabriel in the poem Evangeline)—Longfellow-Evangeline State Park.

vary in width from a few hundred feet to a thousand feet or more; their length could be indefinite. The Highway Commission should play a leading role in this type of work at present.

SCENIC EASEMENTS:

These types of holdings are not owned by the State Parks Commission, but are secured on areas such as monuments and recreation reserves in which relatively small extent of public ownerships will supply sufficient space for all necessary or desirable public uses. The State supplements such public ownerships with easements on adjoining property, by which use of such property for undesirable purposes may be prevented.

Essential to the character of any State Park is the preservation of the native landscape and native fauna to the extent that provisions for enjoyment of active recreation use facilities shall not be permitted to destroy or materially impair valuable landscape features or to injure wildlife or its natural habitat and to the further important extent that all of its natural resources shall be withheld from commercial utilization.

## SELECTION OF STATE PARK AREAS

Since, as stated above, these areas designated as State Parks are to be the nucleus or backbone of the system of public areas under its charge and are to be the major undertaking of the State Parks Commission, great care is taken in the inspection and selection of prospective park areas. It is impossible to set up definite rules that would govern in the selection of sites; however, the State Parks Commission has established several standards that should be approached before an area should be definitely designated as a link in the park system of the state.

PUBLIC HEALTH:

The first and all important question in investigating any site is its condition relative to the safeguarding and protection of public health. The area should be so located or contain such topographic features that there could be no possible exposure of the public to disease in any form, and there should be an ample supply of pure water and means of inaugurating sanitary disposals without any possibility of pollution. No consideration whatsoever will be given a prospective site unless it can meet this requirement.

SCENIC BEAUTY:

The State Parks Commission in considering the scenic beauty of a proposed area endeavors to secure a site that will compare favorably with other areas in the system. The scenic areas sought as State Parks are to be chosen for their individuality and unusualness and should take the same place in the State Park System that the National Parks hold in the National Park System.

RECREATION VALUE:

The recreational possibilities of an area are determined by the unusual or unique features not to be found in the other areas of the state with well diversified fields for all recreational features contemplated for the park.

POSSIBLE ACQUISITION:

Areas being investigated for selection as park sites should be such that the unit would be complete within itself and could be administered and protected to the best possible advantage, particularly that the intensive use area could be restricted and the remaining area preserved and protected.

CONCENTRATION OF POPULATION:

The prime factor in the selection of an area will be its location with reference not only to concentration of population, but also with reference to the possibility of serving the greatest number of transients or tourists, as well as local people.

WILDLIFE:

As in any other conservation work under which park development falls, it is also desirous that an area should be of such extent or character, if possible, that it would provide year round habitat for wildlife.

Picnic shelter typical for State Parks—Longfellow-Evangeline State Park.

A scene delineating natural beauty to be found in Longfellow-Evangeline State Park.

EDUCATION AND CONSERVATION:

The park area should be preserved not only for the present but for future generations as well. The region, therefore, should afford features of educational and conservation value typical of the region in which they are situated.

EXPANSION:

Since all State Parks are to be permanent, it is well to consider their future use or demands, and it is required that all anticipated expansion be provided for in the original acquisition of areas, as the value of the lands adjacent will be very greatly increased after the chosen site has attained full development and use.

## PRESERVATION AND USE

The regulations governing the selection of State Park areas may cause one to wonder at the rigid requirements and scrutiny with which the sites are chosen. However, these regulations are well justified when it is realized that the sites are to be set aside and preserved for all classes of people, not only of this generation but of the generations to come, and it is of utmost importance that select areas be set aside. To many minds a park is usually an area that has been constructed by man to be enjoyed by man for recreational purposes only. This idea is totally out of keeping with any of the principles to be followed in the establishment of State Parks. There will be certain areas set aside and developed by man to be known as areas of intensive use or service areas and so designed to serve the necessities of man; however, the paramount idea is not to attempt to improve upon the faultless work of nature but to preserve this work in its richest and most natural state.

All construction and public conveniences, with the exception of a few scattered shelters and the trails, will be confined to the service areas. It is planned that in all State Parks there shall be only one road entering the parks, this road leading directly to the service area. It can be readily seen that for these reasons the service area will become not only a point of assembly but a point of distribution for the park visitors.

The facilities to be found in the various service areas of the State Parks are to be parking grounds for machines, camping grounds, picnic grounds, shelter houses, bathhouses, boathouses, and refectories. There will usually be constructed, in addition to these, a lodge, keeper's cottage, and vacation cottages.

All structures, as well as these locations, are to be so chosen and designed so that they will harmonize with the prevailing architectural design and there will be a perfect blend between the natural and the constructed. Wherever it is possible to do so, native or local material such as lumber or stone will be used in the construction. The well designed service area will serve as a safeguard against destruction of the natural scenery by withholding those who seek purely the recreational features, leaving the area open to those persons who are interested enough or appreciate these natural beauties sufficiently to seek out and enjoy them, and who delight to preserve such areas rather than to injure them.

In establishing State Parks the needs of all visitors are contemplated and facilities for serving large groups are planned.

Picnic areas containing shelters, benches and tables, ovens, fresh water and sanitary facilities are placed in appropriate locations to serve the greatest percentage of visitors who require these

(Continued on Page 46)

Typical park trail through dense growth in Louisiana's southern pine region.

# A Discussion of the Shrimp Trawl--- Fish Problem[1]

By **MILTON J. LINDNER,**
**In Charge, Shrimp Investigations, U. S. Bureau of Fisheries.**

(*Editorial Note. The following discussion of the shrimp trawl—fish problem presents one point of view regarding this controversial subject. It does not necessarily express in any way the editorial opinion of the* Louisiana Conservation Review.)

The shrimp trawl consists of a bag of webbing provided with wings which are spread by a pair of otter boards. The otter boards or doors act very much like a kite and serve to open the net and retain it on the ocean floor. In the process of capturing shrimp this trawl also secures large quantities of fishes most of which are small or immature forms. These fishes, after being brought on deck, are sorted and all of marketable size retained. Those remaining, which usually number considerably more than those saved, are thrown back into the sea. The majority of discarded fishes are either dead or moribund. This practice raises the question—Is the shrimp trawl causing serious damage to the sport and commercial fishes of the South?

In analyzing the effects of the shrimp trawl, neglecting the aspect of the possible depletion of the shrimp supply, we find that there are various factors influencing the situation, some harmful and some beneficial, that might arise from the use of the trawl. Just how important any of these factors might be is not known chiefly because of their complexities but in any event before a complete picture of the effects of trawling can be secured each of these problems must be dealt with. The immediate discussion is not intended for a scientific dissertation on the shrimp-trawl problem. Its purpose is entirely one of presenting to the various interested parties the complexities involved and our present lack of statistical data and information upon which to make justifiable conclusions.

## POSSIBLE BENEFICIAL RESULTS FROM SHRIMP TRAWLING

### Increase in Shrimp Supply by Reducing Numbers of Predators

Plant life in the sea as on the land is the basis of all life. It is the green plant which with the energy derived from sunlight can convert carbon dioxide and water into sugars and starches. Animals, on the other hand, are unable to generate their own food but must secure it by eating some other animal or some plant, consequently the plants in the sea eventually determine the quantity of animals ultimately to be produced. The vegetarian organisms in the sea feed upon the plants and the carnivores prey upon the vegetarians and other carnivores. Because of this long chain of fish eat fish, if something occurs to

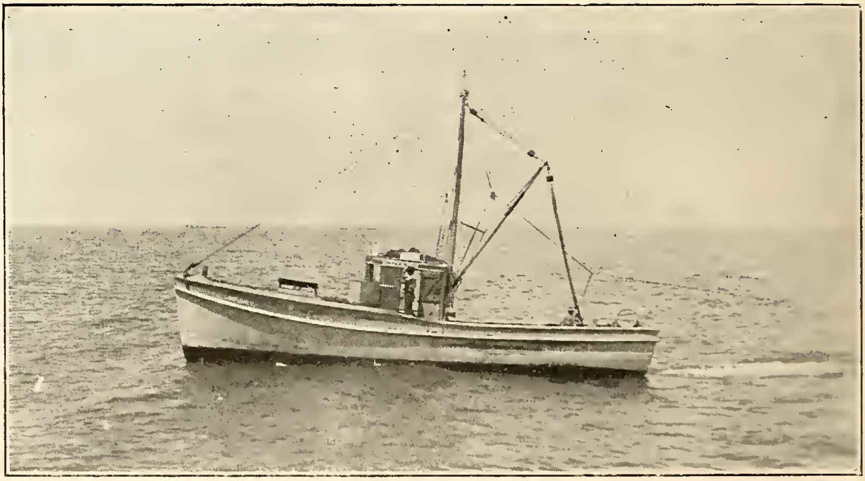

Figure 1. A shrimp trawler operating off the East Coast of Florida.

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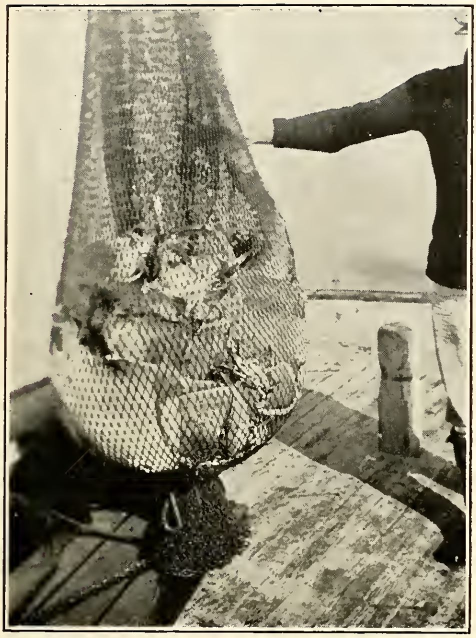

Figure 2. The catch brought on deck. In this instance the take consisted chiefly of rays and crabs.

affect the abundance of any one link in the chain results will be felt all along the line. For example, we know that the shrimp serve as excellent bait for most southern sport and commercial fishes, consequently it can be inferred that most of these fishes feed upon the shrimp at some stage or other during their development. If we were to catch only shrimp in our trawls and none of the fishes that prey upon them it could be presumed that the supply of shrimp would be cut down much more rapidly than would be the case if these predatory fishes were also taken. We might also presume that by taking these fishes in the trawl we are doing away with large numbers of fishes that would ordinarily consume shrimp, hence the shrimp supply would be increased in direct proportion to the amount these predators normally would eat. This problem is not nearly as simple as outlined here since there are undoubtedly many complicating factors arising due to the ecological interassociations of the various fishes with the shrimp.

In addition it must be considered that predators are not the only limiting factor which determines the supply of shrimp but that the food supply of the shrimp, among many other possible factors undoubtedly plays a determining part in the number of shrimp that will survive. A female shrimp lays at least a half million eggs throughout the duration of her life. From these half million eggs we would normally expect only two, one male and one female, to survive until they themselves complete the cycle of reproduction and death. If more than two survive we would soon have nothing but shrimp in the ocean and if less than two there would eventually be no shrimp remaining. From this it is evident that a mortality of 499,998 occurs somewhere between the time of the laying of these half million eggs until the end of the normal reproductive period of the shrimp resulting from the original female. The death of these 499 thousand odd shrimp is due to either unsuitable environmental conditions, starvation, or becoming the food of some other organism. The mortality rate caused by each of these limiting factors is not individually known and they undoubtedly vary from year to year hence it is impossible at this time to state what effect the taking of fish in the shrimp trawl has upon increasing the supply of shrimp.

On the other hand the taking of shrimp by either the trawl or by any other means may reduce the numbers of sport or commercial fishes. If the shrimp is an important food item for any particular species of fish a reduction in numbers of shrimp would undoubtedly mean the loss of food for that species of fish. A restriction of the food supply would cause an increased mortality rate due to starvation in those species affected. Of course it must be remembered that the blame for any loss of fishes by this cause could not be placed entirely upon the shrimp trawl for any gear which would capture shrimp, no matter how innocuous it might otherwise be, could be accused of being harmful to sport and commercial fishes from this particular aspect.

### Increase in Growth Rate and Fatness of Fishes by Thinning Out Young

A certain group of fishery biologists believe that in some instances thinning out young fishes is beneficial. These biologists maintain that in some localities the fishes are utilizing all the available food supply and that where this condition occurs a general starvation of the fishes occurs. With not enough food to go around the fishes become thin and their growth rates slacken making them much poorer for market purposes. If some of the young of these fishes were caught out or killed there would be more food for those remaining, consequently their rates of growth would be increased and they would be in better all around condition. In general most of the fishes taken by the shrimp trawl are young or immature consequently it might be presumed that in certain instances the shrimp trawl is beneficial by thinning out the stock of young fishes.

This is a highly debatable question and the efficacy of trawling in this respect is by no means proven. In order to determine if the trawl were beneficial in this manner it would be necessary to make a complete study of the life history and abundance of each particular species of fish desired. Here again the necessary statistical data and knowledge of the life histories of our southern fishes are too incomplete to even attempt such an analysis.

### INCREASE IN NUMBERS AND GROWTH RATES OF SPECIES OF FISHES BY SUPPLYING TRASH FISHES AS EASILY AVAILABLE FOOD

Along the South Atlantic coast by far the most numbers of fishes taken in the trawl can be classified as "trash" fishes, that is, fish which are of no or of little direct commercial or sport value. In Louisiana, with the exception of the croaker which fish is the most abundant representative in the trawl catches, the majority of fishes taken by the trawl are trash species. It is quite possible that these fishes together with unmarketable economic species when dumped overboard, either dead or moribund, from the shrimp trawls furnish an easily available food supply for the remaining economic fishes thereby increasing their numbers and growth rate. Just how important this particular phase of the trawling question is still remains to be proven for from personal observation it appears that the sharks and sea birds gain more benefit from this source of food than do other organisms. When the trash fishes are sorted out and discarded there is an immediate congregation of gulls, terns and sharks consuming the fishes behind the boat. This is generally the situation in the open waters of the Atlantic or Gulf, but in the less saline inside waters sharks are not so numerous although in these localities the gars come in for their share of the fishes. Sharks and sea birds are also more abundant at certain times of the year than at others.

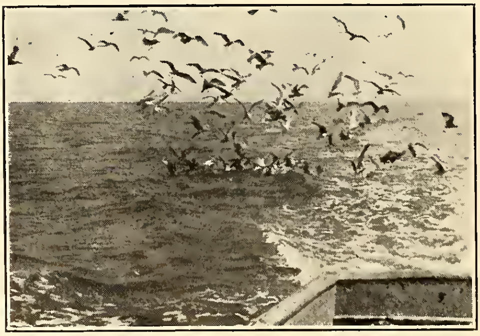

Figure 3. Gulls and terns picking up the "trash" fish discarded from a shrimp trawler.

On one occasion along the Louisiana coast the writer saw porpoises taking dead fish thrown over from the deck of a trawler. On this occasion the porpoises showed a definite preference for the white trout, *Cynoscion arenarius*, and refused to take any of the other species. That it is not generally customary for porpoises to take dead fish thrown over from the trawlers seems evident from the fact that this was observed in only one instance.

In any event the trawl by reducing the number of fishes undoubtedly reduces the competition for food among those fishes remaining, that is the trawl by catching some fishes eliminates these fishes from competing with others for the available food supply in the particular locality in which the fishes are taken. This may prove beneficial if not carried to extreme but just how many fishes the trawl can safely take is not known.

### PROVIDING FOOD BY PLOWING OR STIRRING UP BOTTOM

Although no direct observations have been made on the stirring up or plowing effect the trawl has upon the ocean bottom the extent of this stirring would undoubtedly depend upon the the type of bottom over which the trawl was operating. A hard sandy bottom would most probably be much less affected by the trawl than a soft muddy bottom. In some localities, particularly in deep water off the Louisiana coast, trawling is extremely difficult, apparently due to heavy clay and unevenness of the bottom. On several occasions we have had our trawl loaded with clay that had been dug up either by the otter boards or the lead line. The effect of this stirring up of the bottom on organisms such as clams, worms, etc., is not known although some people believe it beneficial and other contend that it is harmful. On the customary shrimping grounds it is highly probable that the stirring of the bottom by the trawl is indeed minimal. In most instances whatever stirring occurs is probably limited to the upper inch or less of the bottom and does not affect the bottom to any great depth. A properly functioning trawl does not plow into the bottom but rather slides over it but here again the type of bottom plays a large part.

Proponents of the trawl claim that the stirring occasioned by the trawl exposes food to the fishes that ordinarily would escape them whereas opponents claim that the stirring covers up organisms and also mutilates and kills them. From

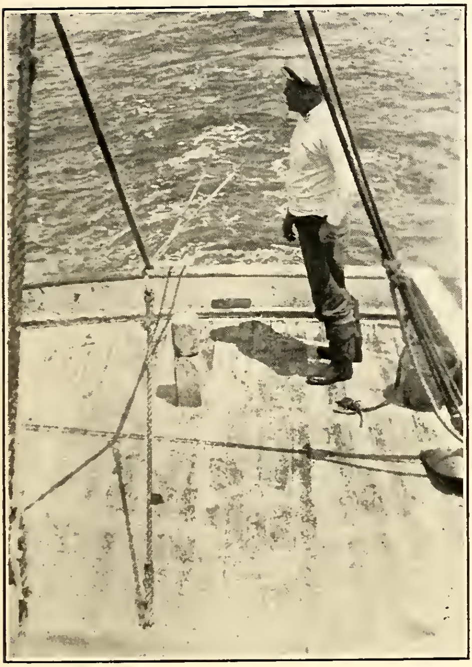

Figure 4. View of the aft deck of U. S. Fisheries Launch 58 while making a haul for shrimp off the Georgia coast.

personal observation it is the writer's opinion that the effect, either beneficial or harmful, that the shrimp trawl has upon the bottom is negligible. The tides and ocean currents, particularly in the shallow waters where most of the trawling for shrimp is done, probably exert more of a stirring action than do the trawls.

## POSSIBLE HARMFUL RESULTS FROM SHRIMP TRAWLING

### Depletion of the Supply of Sport and Commercial Fishes by the Shrimp Trawl

Probably the most important problem concerning the effect of the trawl on the economic fishes, both sport and commercial, is that of the depletion of the supply, either directly through capture in the trawl or indirectly by decreasing food supply, increasing predators, etc. At first glance this problem appears to be one that should be solved easily enough but upon second consideration we become more and more aware of the complexities and difficulties arising and of the impossibility at this time of securing the type of data and information needed in order to definitely and conclusively prove whether or not the trawl is depleting one or more species. Before we can *prove* any statement made about the effects of trawling we must know the abundance in nature of the various organisms taken in the trawl. In other words, we must have a census of each and every species of fish affected by the trawl. We must then continue the census over a sufficient period of time in order to determine the effect of the trawl on each species.

With marine fishes, because of their oceanic habitat, it is impossible to count noses as we would with cattle, dogs or cats and it is also impossible to go from door to door asking questions in order to determine whether Mr. and Mrs. Fish have one or a thousand offspring. A fish census has to be taken in an entirely different manner. Since there are numerous difficulties encountered in making a direct census the fishery biologist instead of finding out how many fish are alive must first discover how many are dead or killed each year or season by the fishing fleet. By mathematical treatment of the catch records and the amount of effort expended in capturing the fish it is possible to arrive at some conclusions regarding the abundance or fluctuations in the abundance of a species involved in a fishery. Only during the past few years has it been possible for the biologist to take a census of certain fishes and then only when the necessary statistical data are available.

In the shrimp trawl fishery there are no data whatsoever available which would permit analysis as to the native abundance of the various species of fishes taken by the trawls, consequently we are immediately ruled out from proving that the trawl is detrimental to any particular species. This statement is not to be construed that the trawl is not detrimental to any fish but it means that because of the lack of suitable data no definite scientific information is available which proves one way or another the effect of the shrimp trawl on any species of fish, consequently for this particular phase of the problem, and presumably the primary problem under consideration, we are relegated to the grade of personal opinion and each person's opinion will differ depending upon his experience, interest, background or whatever it is that makes differences of opinion.

When we count the number of fishes of each species taken by the trawl over a definite period of time we have available information as to the relative numbers of fishes of each species taken by the trawl. From this we can arrive at the average number of each species of fish taken for each hour of trawling but even with this information we are still unable to prove whether or not the trawl is depleting any particular species. We know that on the average one hour of trawling will destroy a certain number of whiting, croakers, spot, trout and other fishes but due to the fact that we do not know the actual abundance of these fishes and what proportion of the total population is being aken by the trawls we cannot state what effect the trawl is having upon each species individually. For instance, the trawl may average over 200 croakers per hour's dragging and only eight flounders, but because of the abundance and general habits of the croakers the effect of the trawl upon the supply of croakers may be negligible whereas on the other hand it may be seriously depleting the flounders. Relative numbers of fishes taken by the trawl means very little when it comes to determining the effect of the trawl upon the population of various species.

Fishery biologists in general agree that extinction of a marine fish by intensive fishing is highly improbable, due to the fact that before extinction occurs the individuals will become too scarce for profitable fishing. On the other hand it is also understood that depletion resulting from heavy fishing is, in most instances, quite possible. By depletion is meant the reduction, through fishing, of the numbers of any fish below the perpetual maximum productive level. Depletion occurs when the supply of any fish is reduced to such an extent that the harvest or catch drops to less than the maximum amount the fishery should normally produce year in and year out.

In many instances it has been shown that the supply of organisms in the sea is not inexhaustable and that fishing can deplete a fishery but in each case where this has occurred the species depleted have been of direct economic importance and a specific gear was used for the specified purpose of catching these particular species. In no case of which the writer is aware has it been shown that a gear used primarily for the taking of one species has been the direct cause of depletion of other species taken incidentally and not intentionally along with the particular fish desired. In other words, it is yet to be proven that a gear such as the shrimp trawl, the primary function of which is to catch shrimp, is detrimental to other species of organisms which happen to be taken in the trawl but are regarded as trash and thrown overboard by the fishermen. Or putting it in another way, it is known that the supply of any one species of fish can be depleted if it bears the brunt of a fishery but it is not known that a supply of fishes can be depleted if it is not the object of a fishery but an objectionable concomitant of it. In the shrimp fishery, shrimp represent the objective of the trawlers and the fishes captured by the trawl are considered objectionable, in most instances, by the fishermen.

Granting that it is possible for the trawlers to deplete the shrimp supply we must then consider whether or not it is also possible for these trawlers to deplete the supply of fishes taken in conjunction with the shrimp but unwanted by the fishermen. The answer to this question depends entirely upon the habits of the fishes. If any fish has habits similar to those of the shrimp, that is if it is primarily a bottom form and if its range is restricted to that of the area covered by the fishing fleet, it is quite probable that this species could accidentally be depleted by the trawlers in their efforts to capture the shrimp. Not enough is known about the life histories and habits of the various fishes taken by the trawl to state definitely that they come within or without this category. It is quite possible that some fishes, which ones we do not know, are restricted to the trawling area and therefore are subject to depletion by the trawlers.

### Increase in Number of Predators by Supplying Easily Available Food

As stated before, the trawl when brought on deck is emptied of its contents, the shrimp and marketable fishes sorted out and all trash fishes discarded overboard. By the time the sorting has been accomplished and the fishes thrown overboard most of them are either dead or moribund. Death of these fishes occurs much more rapidly during the summer than during the winter. The fishes, when thrown overboard, either float on the surface or gradually sink, consequently there is usually a large flock of sea birds gathered behind a trawler to devour these fish and at the same time sharks will converge upon them from below. It is possible that the discarding of the trash fishes furnishes an easily available food supply for the sharks thereby tending to increase their numbers. It is impossible to evaluate any damage that might result from an increase in predators directly through this means and the effect may be negligible, nevertheless the possibility still remains.

Again it must be remembered that before any estimation of damage or benefit may be placed upon any one particular phase of the trawling problem that there are to be considered other correlated and associated factors. In this instance any harm due to an increase in predators resulting directly from trawling may be offset by thinning and by reducing competition for food among the remaining forms. These particular phases are entirely too complicated to hope for an answer at this time.

### ENCOURAGE SHARKS TO APPROACH BATHING BEACHES

The objection has been raised, particularly in South Carolina, that trawling induces sharks to approach the bathing beaches by the actions of the fishermen in throwing dead fishes overboard in the proximity of the beaches. On occasions fishes pursued by the sharks drift in close to shore. Although the writer is unaware of any instances where the sharks have actually done any damage to bathers, the practice of dumping fishes close to a bathing beach should be discouraged. It is quite probable that the sharks themselves would not harm the bathers but the psychological impression upon a bather of a shark in his proximity is, to say the least, disquieting.

### DRIVE FISHES AWAY FROM AN AREA

Quite frequently it is heard that the trawl dragging over the bottom day in and day out in any particular locality would tend to drive fishes away from that area. This undoubtedly can be discounted in practically all instances for if this were the case there would be no fishes appearing in those localities in which the trawl has been in operation for the past twenty years. The passing of the trawl in the immediate vicinity of a fish undoubtedly startles it for a short time. The belief that this effect lasts for any length of time is most probably erroneous for the trawl is still catching fish in localities where trawling has been in progress for years. If the trawl were driving the fishes away these fishes most assuredly would not be appearing in the trawl catches and one of our major problems, that of the shrimp trawl directly depleting the fishes, would be eliminated.

### DESTROY SPAWNING GROUNDS

Many people believe that all fishes lay their eggs on the bottom and that trawling in these areas of spawning or on the spawning grounds would destroy the spawn. The eggs of the majority of fishes in the waters along the South Atlantic coast and the Gulf of Mexico float either at or near the surface and do not lie upon the bottom, consequently the trawl dragging over the bottom would not affect the spawn. The only harm done to spawn would be the capture of the spawning fishes. It is probable that the erroneous popular conception concerning the spawning of fishes is due to the fact that the spawning areas are called spawning grounds.

### OTHER CONSIDERATIONS

Since we have no reliable statistics available which can be analyzed to shown the trend of the populations of various economic fishes that might be affected by the trawl we are forced to rely upon the statements of the fishermen both sport and commercial concerning the abundance of these fishes. Before making any conclusions from these statements we must bear in mind that it is a well known psychological fact that after a lapse of time people tend to remember the occasions when good catches were made and the times when poor fishing occurred tend to be forgotten or at least minimized.

The effects of competition should also be considered when we attempt to evaluate the changes in abundance of any one species of fish over a period of time. During the past few years the improvements in automobiles, roads, and boats have all accomplished an increase in the number of sport fishermen. At the same time there has been an increase in commercial fishing. All of these result in an increase in the total effort expended toward the capture of fishes. Undoubtedly competition is occurring and even though the same number of fishes are produced now as were produced thirty years ago, each fisherman should expect to catch fewer fishes because they have to be distributed among more fishermen. We would naturally expect one fisherman to catch more fishes in a certain spot if he were the only fisherman there than if he were one of a group of ten fishing in that spot. The same situation would prevail over an entire area if the total fishing intensity, either sport or commercial, were increased in this area.

Oyster reefs or "drops", as they are called along the South Atlantic coast, are favorite congregating places for sport fishes. These oyster reefs undoubtedly furnish an important source of food and probably shelter for the young of numerous economic fishes. During the past thirty years the oyster reefs, particularly those along the South Atlantic coast and in many localities in the Gulf, have been sadly depleted. The reefs of Louisiana probably have been less disturbed than those of most of the other states. It is impossible to prove whether or not the denuding of the oyster grounds has had its effect upon any of the fishes but it is probable that this change in the environment has been, to some extent at least, detrimental.

If it can be proven that the trawl is causing serious damage to certain fishes the problem then resolves it self into one of economics, that is, is it more beneficial to limit or restrict the operations of the shrimp trawl in spite of the harm it may be doing or is it a better economic policy to allow the trawl fishing to continue unrestricted. The program to be followed would depend upon

(Continued on Page 51)

# Studies of the Destruction of Marine Fish by Shrimp Trawlers in Louisiana[1]

By **GORDON GUNTER,**
**Formerly Temporory Assistant, U. S. Bureau of Fisheries.**

(*Editorial Note. The following discussion of the shrimp trawl—fish problem presents one point of view regarding this controversial subject. It does not necessarily express in any way the editorial opinion of the* Louisiana Conservation Review.)

## INTRODUCTION

One of the first problems brought to the attention of the Louisiana Department of Conservation and U. S. Bureau of Fisheries Investigators at the beginning of their study of the salt water shrimp in Louisiana was that of the destruction of fish by shrimp trawlers, who unavoidably catch fish along with shrimp. Lindner (7) in 1933, and Myers and Gowanloch (8) in 1934, called attention to the work then being done on this problem.

It is obvious to anyone who has observed the situation that enormous numbers of fish are destroyed by commercial shrimpers. The fish and shrimp are caught together in an otter trawl and dumped on deck, where they die very quickly. Subsequently, at their convenience the fishermen segregate the shrimp and throw the dead or moribund fish overboard.

In studying the problem it will be necessary to get an accurate estimate of the amount of destruction, and data on the various species destroyed at the different seasons of the year along with data on the relative number and importance of the different species. This paper presents data having a direct bearing on the second part of this question.

It is impossible to collect accurate statistics on the fish destroyed by trawlers in Louisiana, which would be of great value in studying their effect, for the reasons that: the numbers of fish caught at times by a single boat would take hours to count, and the separation of fish into species, counting or measuring them in bulk and tabulation of the data is a tedious task for which most fishermen are not fitted and in which few would take interest. The only alternative would be to send trained observers out on a number of boats for several years. This is probably not feasible at present. Due to the lack of decisive data for

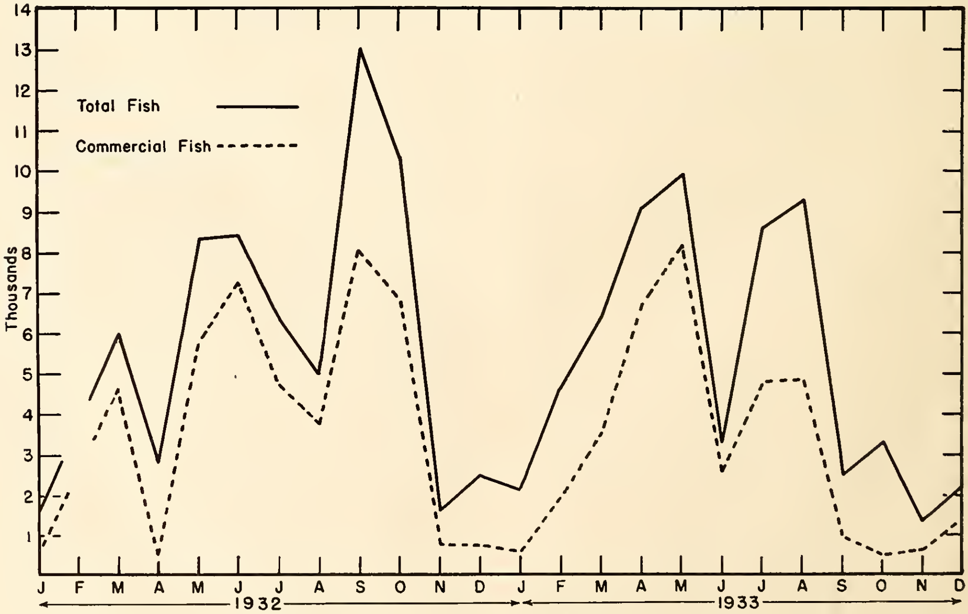

Fig. 1. Total fish and commercial fish taken in trawls 1932-33.

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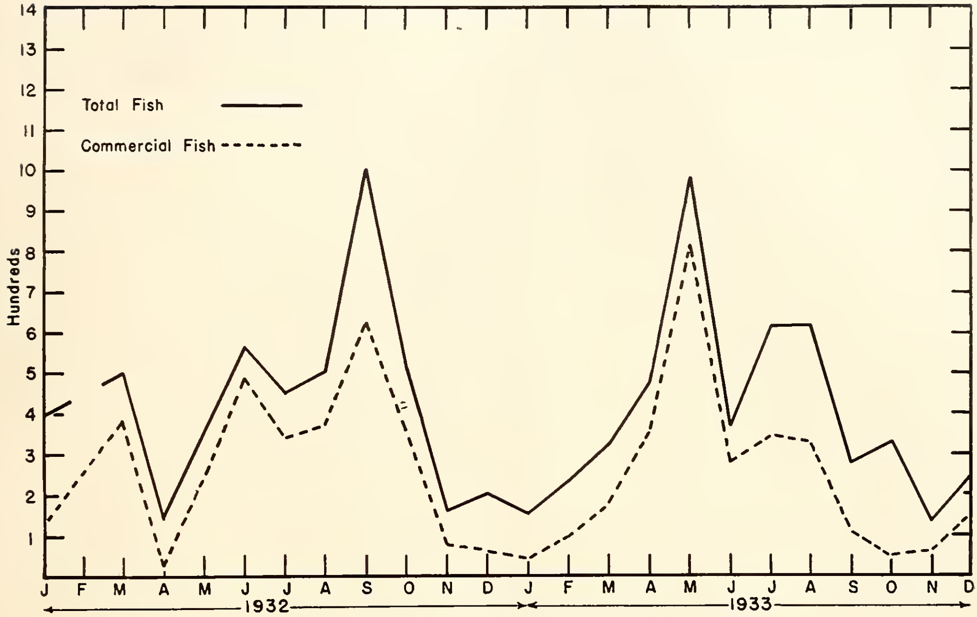


Fig. II. Total fish and commercial fish, average per haul.

determining depletion or maintenance of the fish population this paper is confined chiefly to the second part of the problem as stated above.

## DISCUSSION OF DATA

### COLLECTION OF DATA

The data presented below were collected on the "Black Mallard" by the writer from January, 1932, to June, 1933, and by John C. Pearson of the U. S. Bureau of Fisheries staff, from July to December, 1933. They are taken from 313 otter trawl hauls of approximately one hour's duration each. The gear was the same as that employed by the shrimp fishermen. Hauls were made at regular intervals each month at regular stations in Barataria Bay and the adjacent Gulf of Mexico, which waters are typical of most of the Louisiana coast. The procedure used gives figures for both inside (bay) and outside (gulf) waters. The distribution of the hauls was as follows: 1932, inside 95, outside 59; 1933, inside 100, outside 59. The fish caught were separated into species which were counted and recorded. The figures were combined by months. Anderson has carried on similar work in Georgia in connection with the Shrimp Investigations. (See Lindner (7) ). Johnstone and Jenkins (6) give figures for similar work on the Mersey shrimping ground of Great Britain. Their data were collected from 1893 to 1899 by Eccles on 348 hauls averaging one hour in duration. They were rather scattered and were not used for analyses.

### SOME ASPECTS OF TRAWLING

The trawls are dragged rather slowly through the water behind power boats. The more agile forms escape, small species and chiefly the young of these preponderate in the catches. Very few large fish are caught. Occasionally sluggish slow-moving forms such as rays, flounders, and alligator gars are taken. The turbidity of the coastal waters, and particularly that of the bays, is high so that the inability of the fish to see the advancing trawl until it is too late to avoid it probably accounts for the large catches often made. It is worthy of note that the jellyfish, *Stomolophus* sp., which cannot avoid trawls, are sometimes taken in such huge numbers as to preclude trawling in certain localities for days at a time. The recent work of Beebe (1) with the bathysphere in Bermuda has indicated to him that the trawl is inefficient in clear water. In the shallow waters of the Louisiana coast it seems to be ineffective only for the larger forms. Sharks, which are fairly swift, are the only fish in this category that the writer has taken. They are quite destructive to trawls in their efforts to reach the fish within and it is probable that they are taken during these attempts.

Some idea of the numbers of fish destroyed can be gained from the following figures. The research boat, "Black Mallard", caught over 126,000 fish in approximately 300 hours of trawling during the years 1932-1933. About 2,000 boats operate in Louisiana during the trawling season. The numbers they destroy must be vast.

### Catch of Commercial Fish and Their Relative Abundance in Bay and Gulf Waters

Table I-a and table I-b give the number of commercial fish caught for the years 1932 and 1933, respectively. The croaker (*Micropogon undulatus*) was caught in much larger numbers than any other fish, and more than all other fish of economic importance put together so that of this category over four-fifths of the total number were croakers. In both years the croaker, white trout (*Cynoscion arenarius*) and spot (*Leiostomus xanthurus*) ranked first, second and third, respectively, in numbers caught. According to Bureau of Fisheries statistics, Fiedler (2), and Statistical Bulletin No. 1073 (10), these three species brought $18,354 to the fishermen of Louisiana in 1931 and 1932. This is probably an underestimate. These fish are also valuable to the sports fishermen, but obviously this value is an unmeasurable quantity. The black mullet (*Menticirrhus americanus*), spotted trout (*Cynoscion nebulosus*) and flounder (*Paralichthys lethostigmus*) are more important commercially than the first three species, their value to the fishermen being $80,460 for 1931 and 1932. The tables show that they were taken in relatively small numbers. Apparently they are not much affected by trawls, but it would not be strictly correct to imply this. Their relative abundance is unknown and it is entirely possible that small numbers taken would be a greater drain on these species than the much larger numbers of croakers taken would represent for that species. The table shows that the pompano (*Trachinotus carolinus*), Spanish mackerel (*Scomberomorus maculatus*), sheepshead (*Archosargus probatocephalus*) and white mullet (*Mugil cephalus*), were caught in very small quantities. It is probable that trawling affects them directly to a negligible extent.

The figures in Table I show that the spotted trout, flounder, and yellowtail (*Bairdiella chrysura*) were more abundant in the Bay than in the Gulf in both years. The black mullet, spadefish (*Chaetodipterus faber*), and white trout (*Cynoscion nothus*) were more abundant on the outside than on the inside. Of the three species

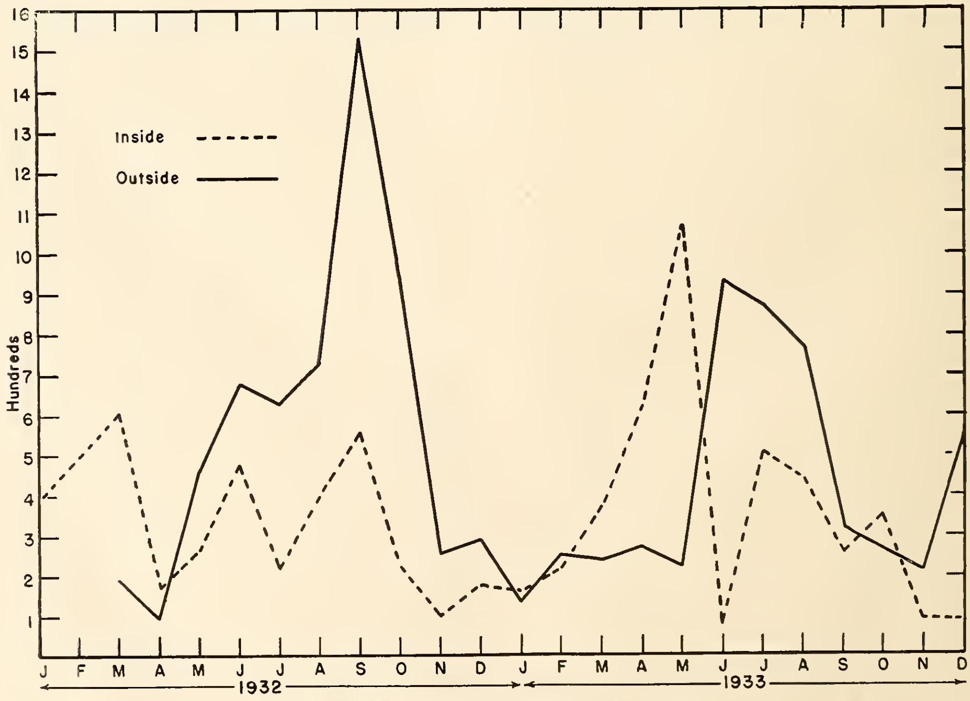


Fig. III. Total fish, inside and outside, averages per haul.

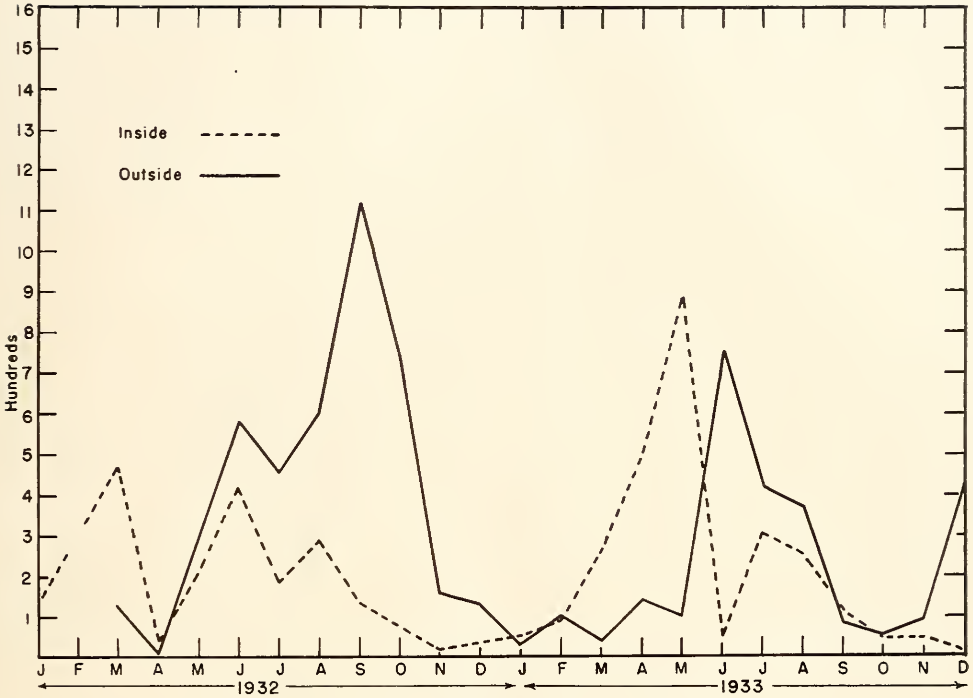


Fig. IV. Commercial fish, inside and outside, averages per haul.

caught in larger numbers the white trout (*Cynoscion arenarius*) was about evenly distributed between inside and outside for both years. The averages indicate that it was slightly more abundant on the outside in 1933. For some obscure reason, the croaker and spot shifted in predominance from outside to inside from 1932 to 1933. Figures weighted for each month which make the results of one year as nearly comparable to the other as it is possible to get them, show the same results as the actual figures so the latter were adhered to. Evidently the methodical manner in which the work was carried out gives results which are comparable from year to year.

The writer has shown by tables and graphs in an unpublished report the seasonal periods of greatest abundance of the more common species of fish. The results for the more important ones will be cited. The croaker and both species of white trout are abundant from spring until fall. The spot is most numerous in the early spring and summer. The black mullet reached its highest peak on the outside during the winter. The spotted trout were most plentiful in the winter months on the inside.

The close season for shrimp trawling in Louisiana is from March 1st to April 15th and from June 10th to August 10th. The heaviest shrimping season in the spring is from April 15th to June 10th, and in the fall from August 10th to November 1st. According to the results given above, the croaker, white trout and spot are subject to more fishing than the spotted trout, black mullet and yellowtail which are more common in the winter months during the slack trawling season. The spotted trout is fortunate insofar as it is most abundant in the shallow waters of the bay at a time of the year when there are little or no shrimp present.

## CATCH OF NON-COMMERCIAL FISH

Tables II-a and II-b give the numbers of non-commercial fish caught for 1932 and 1933. It is not correct to say that these fish are of no importance. It is well to remember that these fish, while small, are very numerous and serve as an important source of food for the larger and more important fish and are a vital link in the ecological associations of this area.

It is apparent from the figures which species were most commonly taken. It will be noted that some of them changed their relative positions from 1932 to 1933. The first nine are obviously most important. The star drum (*Stellifer lanceolatus*) and the cutlass fish (*Trichiurus lepturus*) were most abundant in the Gulf for both years. The anchovy (*Anchoviella epsetus*), the seacat (*Galeichthys milberti*) and the menhaden (*Brevoortia patronus*) predominated in the bay. The threadfin (*Polynemus octonemus*) and the moonfish (*Vomer setapinnis*) shifted for the two years studied. With the less numerous species we are not greatly concerned. They were included for the sake of completeness. A record of the fish most rarely taken has been published elsewhere. (See Gunter (4) ).

### ABUNDANCE VARIATION FROM MONTH TO MONTH AND ITS RELATION TO TRAWLING SEASONS

Table III gives figures for total fish and commercial fish caught, both inside and outside, for each month of the year from January, 1932, to December, 1933. Table IV is derived from Table III and gives the average number of fish taken each haul for the same month. Graphs were made of these figures and will be used in the discussion below. They are self-explanatory.

Figure I shows the number of total fish and of commercial fish taken each month for the two years studied. Figure II shows the average number of total fish and of commercial fish taken each haul each month for the same period. They both give essentially the same picture, but Figure II is smoother due to the use of averages. It is probable that it is also more truly representative than Figure I which is based on actual figures without consideration of the number of hauls made. It is clear from the graphs that the total catch was largely composed of commercial fish. According to the actual figures, two-thirds of the total fish taken were commercial fish. These were chiefly croakers, white trout and spot. Figure II shows more clearly than Figure I the seasonal period of greatest abundance for both total fish and commercial fish. This period extended from May to October, in 1932, and from March to September, in 1933. In other words, fish are present in the greatest numbers in the Gulf waters near the coast from late spring to early fall. This is a point of biological interest as well as economic importance.

A majority of these fish, especially those taken on the inside, are immature individuals. The bay waters act as a nursery ground for many species. The young grow up in the summer and help to

TABLE I-a

Commercial Fish Taken in Shrimp Trawls, 1932

| Common Name | Scientific Name | Inside | Average Per Haul | Outside | Average Per Haul | Totals | Average Per Haul |
|---|---|---|---|---|---|---|---|
| Croaker | Micropogon undulatus | 13,228 | 139.2 | 22,950 | 388.9 | 36,178 | 234.9 |
| White Trout | Cynoscion arenarius | 2,556 | 26.9 | 1,619 | 27.4 | 4,175 | 27.1 |
| Spot | Leiostomus xanthurus | 430 | 4.5 | 794 | 13.5 | 1,224 | 7.9 |
| Yellowtail | Bairdiella chrysura | 475 | 5.0 | 121 | 2.1 | 596 | 3.9 |
| White Trout | Cynoscion nothus | 15 | 0.2 | 426 | 7.2 | 441 | 2.9 |
| Spotted Trout | Cynoscion nebulosus | 335 | 3.5 | 11 | 0.2 | 346 | 2.2 |
| Black Mullet | Menticirrhus americanus | 101 | 1.1 | 243 | 4.1 | 344 | 2.2 |
| Spadefish | Chaetodipterus faber | 54 | 0.6 | 72 | 1.2 | 126 | 0.8 |
| Flounder | Paralichthys lethostigmus | 109 | 1.1 | 6 | 0.1 | 115 | 0.7 |
| Pompano | Trachinotus carolinus |  |  | 18 | 0.3 | 18 | 0.1 |
| Spanish Mackerel | Scomberomorus maculatus | 4 | * | 4 | 0.1 | 8 | * |
| Sheepshead | Archosargus probatocephalus | 2 | * |  |  | 2 | * |
|  | TOTALS | 17,309 | 182.2 | 26,264 | 445.1 | 43,573 | 282.8 |

*Less than 0.1

TABLE I-b

Commercial Fish Taken in Shrimp Trawls, 1933

| Common Name | Scientific Name | Inside | Average Per Haul | Outside | Average Per Haul | Totals | Average Per Haul |
|---|---|---|---|---|---|---|---|
| Croaker | Micropogon undulatus | 20,933 | 209.3 | 7,792 | 132.1 | 28,725 | 180.7 |
| White Trout | Cynoscion arenarius | 1,890 | 18.9 | 1,803 | 30.5 | 3,693 | 23.2 |
| Spot | Leistomus xanthurus | 865 | 8.7 | 515 | 8.7 | 1.380 | 8.7 |
| Black Mullet | Menticirrhus americanus | 73 | 0.7 | 861 | 14.6 | 934 | 5.9 |
| Yellowtail | Bairdiella chrysura | 532 | 5.3 | 157 | 2.7 | 689 | 4.3 |
| Spotted Trout | Cynoscion nebulosus | 463 | 4.6 | 7 | 0.1 | 470 | 2.9 |
| White Trout | Cynoscion nothus | 21 | 0.2 | 376 | 6.4 | 397 | 2.5 |
| Flounder | Paralichthys lethostigmus | 100 | 1.0 | 12 | 0.2 | 112 | 0.7 |
| Spadefish | Chaetodipterus faber | 25 | 0.3 | 72 | 1.2 | 97 | 0.6 |
| Spanish Mackerel | Scomberomorus maculatus | 7 | 0.1 | 6 | 0.1 | 13 | 0.1 |
| White Mullet | Mugil cephalus | 7 | 0.1 |  |  | 7 | * |
| Pompano | Trachinotus carolinus |  |  | 2 | * | 2 | * |
| Sheepshead | Archosargus probatocephalus | 1 | * |  |  | 1 | * |
|  | TOTALS | 24,917 | 249.2 | 11,603 | 196.6 | 36,520 | 229.7 |

*Less than 0.1

form the abundance peak found. How much trawls affect the fish of this region is not known, but, whatever the degree, it is mostly exerted on young fish.

The shrimp, crabs and other invertebrates likewise have their seasonal cycle of abundance in the summer and fall. Naturally the shrimping season falls in this period and the young fish are caught with the shrimp.

During the spring shrimp season, from April 15th to June 15th, trawling is carried on chiefly in the Gulf. During the fall season, from August 10th to November 1st, trawling is largely carried on in the bays. Evidently a critical analysis of the catch of fish by trawls will take these factors into consideration. Figure III shows the average number of fish taken each haul for the months studied for both inside and outside. Figure IV gives the same thing for commercial fish only. No definite conclusion can be drawn except that

TABLE II-a

Non-Commercial Fish Taken in Shrimp Trawls, 1932

| Common Name | Scientific Name | Inside | Average Per Haul | Outside | Average Per Haul | Totals | Average Per Haul |
|---|---|---|---|---|---|---|---|
| Anchovy | Anchoviella epsetus | 3,983 | 42.0 | 1,128 | 19.1 | 5.111 | 33.2 |
| Star Drum | Stellifer lanceolatus | 801 | 8.4 | 4.059 | 68.8 | 4,860 | 31.6 |
| Sea Cat | Galeichthys milberti | 1,824 | 19.2 | 593 | 10.1 | 2,417 | 15.7 |
| Menhaden | Brevoortia patronus | 2,166 | 22.8 | 130 | 2.2 | 2,296 | 14.9 |
| Cutlass Fish | Trichiurus lepturus | 161 | 1.7 | 1,000 | 16.9 | 1,161 | 7.5 |
| Hogchoker | Achirus fasciatus | 413 | 4.3 | 501 | 8.5 | 914 | 5.9 |
| Fringed Flounder | Etropus crossotus | 710 | 7.5 | 79 | 1.3 | 789 | 5.1 |
| Threadfin | Polynemus octonemus | 327 | 3.4 | 394 | 6.7 | 721 | 4.7 |
| Gaff Tops'l | Felichthys felis | 603 | 6.3 | 76 | 1.3 | 679 | 4.4 |
| Moonfish | Vomer setapinnis | 270 | 2.8 | 202 | 3.4 | 472 | 3.1 |
| Whiff | Citharichthys spilopterus | 427 | 4.5 | 26 | 0.4 | 453 | 2.9 |
| Striped Sole | Achirus lineatus | 243 | 2.6 | 56 | 0.9 | 299 | 1.9 |
| Tonguefish | Symphurus plagiusa | 196 | 2.1 | 72 | 1.2 | 268 | 1.7 |
|  | Signalosa atchafalayae | 181 | 1.9 | 9 | 0.2 | 190 | 1.2 |
| Puffer | Spheroides spengleri | 142 | 1.5 | 18 | 0.3 | 160 | 1.0 |
| Sea Robin | Prionotus tribulus | 89 | 0.9 | 50 | 0.8 | 139 | 0.9 |
| Banded Croaker | Larimus fasciatus | 5 | * | 104 | 1.8 | 109 | 0.7 |
| Bumper | Chloroscombrus chrysurus | 19 | 0.2 | 42 | 0.7 | 61 | 0.4 |
| Butterfish | Poronotus triacanthus | 27 | 0.3 | 19 | 0.3 | 46 | 0.3 |
| Lookdown | Selene vomer |  |  | 46 | 0.8 | 46 | 0.3 |
| Jackfish | Caranx hippos | 19 | 0.2 | 9 | 0.2 | 28 | 0.2 |
| Stingaree | Dasyatis sabina | 11 | 0.2 | 1 | * | 12 | 0.1 |
| Florida Hake | Urophycis floridanus | 11 | 0.2 | 1 | * | 12 | 0.1 |
| Harvest Fish | Peprilus paru | 1 | * | 6 | 0.1 | 7 | * |
| Lizzard Fish | Synodus foetens | 5 | 0.1 | 2 | * | 7 | * |
| Green Puffer | Lagocephalus loevigatus | 3 | * | 3 | 0.1 | 6 | * |
|  | TOTALS | 12,637 | 133.1 | 8,626 | 146.2 | 21,263 | 138.1 |

*Less than 0.1

*TABLE II-b*

Non-commercial Fish Taken in Trawls, 1933.

| Common Name | Scientific Name | Inside | Average Per Haul | Outside | Average Per Haul | Totals | Average Per Haul |
|---|---|---|---|---|---|---|---|
| Star Drum | Stellifer lanceolatus | 874 | 8.7 | 3,833 | 65.0 | 4,707 | 29.6 |
| Anchovy | Anchoviella epsetus | 3,041 | 30.4 | 1,196 | 20.3 | 4,237 | 26.6 |
| Cutlass Fish | Trichiurus lepturus | 1,020 | 10.2 | 1,442 | 24.4 | 2,462 | 15.5 |
| Sea Cat | Galeichthys milberti | 1,388 | 13.9 | 912 | 15.5 | 2,300 | 14.5 |
| Moonfish | Vomer setapinnis | 686 | 6.7 | 1,448 | 24.5 | 2,134 | 13.4 |
| Menhaden | Brevoortia patronus | 1,767 | 17.7 | 352 | 6.0 | 2,119 | 13.3 |
| Threadfin | Polynemus octonemus | 1,655 | 16.6 | 356 | 6.0 | 2,011 | 12.6 |
| Hogchoker | Achirus fasciatus | 1,090 | 10.9 | 237 | 4.0 | 1,327 | 8.3 |
| Butterfish | Poronotus triacanthus | 478 | 4.8 | 825 | 14.0 | 1,303 | 8.2 |
| Gaff Tops'l | Felichthys felis | 402 | 4.0 | 350 | 5.9 | 752 | 4.7 |
| Fringed Flounder | Etropus crossotus | 171 | 1.7 | 231 | 3.9 | 402 | 2.5 |
| Whiff | Citharichthys spilopterus | 315 | 3.2 | 33 | 0.6 | 348 | 2.2 |
| Bumper | Chloroscombrus chrysurus | 29 | 0.3 | 255 | 4.3 | 284 | 1.8 |
| Sea Robin | Prionotus tribulus | 103 | 1.0 | 63 | 1.1 | 166 | 1.0 |
|  | Signalosa atchafalayae | 119 | 1.2 | 18 | 0.3 | 137 | 0.9 |
| Tonguefish | Symphurus plagiusa | 37 | 0.4 | 77 | 1.3 | 114 | 0.7 |
| Florida Hake | Urophycis floridanus | 66 | 0.7 | 41 | 0.7 | 107 | 0.7 |
| Striped Sole | Achirus lineatus | 83 | 0.8 | 16 | 0.3 | 99 | 0.6 |
| Puffer | Spheroides spengleri | 68 | 0.7 | 14 | 0.2 | 82 | 0.5 |
| Banded Croaker | Larimus fasciatus | 2 | * | 63 | 1.1 | 65 | 0.4 |
| Stingaree | Dasyatis sabina | 37 | 0.4 | 7 | 0.1 | 44 | 0.3 |
| Jackfish | Caranx hippos | 15 | 0.2 | 5 | * | 20 | 0.1 |
| Green Puffer | Lagocephalus loevigatus | 6 | * | 6 | 0.1 | 12 | 0.1 |
| Harvest Fish | Peprilus paru | 4 | * | 8 | 0.1 | 12 | 0.1 |
| Lizzard Fish | Synodus foetens | 9 | 0.1 | 2 | * | 11 | 0.1 |
|  | TOTALS | 13,465 | 134.7 | 11,790 | 199.8 | 25,255 | 158.8 |

there are large numbers of fish present in each locality at the time of heavy shrimping. Figure III indicates the possibility of a bimodal abundance for the inside of spring-summer and summer-fall duration with a low point in July of 1932 and in June of 1933. There is also an increasing rise of abundance on the outside to a peek in the late summer and fall which is most probably caused by an outward migration of young fish from the bay to the Gulf as summer progresses. Figure IV, for the commercial fish, bears out the same hypothesis except that the high point for the outside is June of 1933 rather than in the late summer. During the fall season when trawling is on the inside most of the fish seem to be in the Gulf. This is a favorable fact. The relative abundance during the spring season at the time of trawling in the Gulf is high and large numbers of fish are present but they are not so plentiful as during the fall.

### HARMFUL FISH DESTROYED BY TRAWLS

There may be some disagreement about the status of fish included in this category, but there

(Continued on Page 45)

TABLE III

Numbers of Fish Caught by the Black Mallard by Trawls

| 1932 | All Fish | | | Commercial Fish | | |
|---|---|---|---|---|---|---|
| | Inside | Outside | Totals | Inside | Outside | Totals |
| January | 1,582 | ...... | 1,582 | 513 | ...... | 513 |
| February | ...... | ...... | ....... | ...... | ...... | ...... |
| March | 5,453 | 574 | 6,027 | 4,250 | 389 | 4,639 |
| April | 2,074 | 792 | 2,866 | 456 | 80 | 536 |
| May | 3,749 | 4,570 | 8,319 | 2,909 | 2,831 | 5,740 |
| June | 4,346 | 4,076 | 8,422 | 3,787 | 3,505 | 7,292 |
| July | 1,324 | 5,021 | 6,345 | 1,121 | 3,634 | 4,755 |
| August | 2,805 | 2,214 | 5,019 | 1,913 | 1,800 | 3,713 |
| September | 3,871 | 9,172 | 13,043 | 954 | 7,107 | 8,061 |
| October | 2,739 | 7,583 | 10,322 | 940 | 5,883 | 6,823 |
| November | 596 | 1,024 | 1,620 | 119 | 634 | 753 |
| December | 1,603 | 882 | 2,485 | 347 | 401 | 748 |
| 1933 | | | | | | |
| January | 1,132 | 978 | 2,110 | 346 | 225 | 571 |
| February | 2,651 | 2,016 | 4,667 | 1,135 | 798 | 1,933 |
| March | 4,482 | 1,916 | 6,398 | 3,197 | 326 | 3,523 |
| April | 6,857 | 2,187 | 9,044 | 5,534 | 1,148 | 6,682 |
| May | 9,651 | 214 | 9,865 | 8,054 | 102 | 8,156 |
| June | 487 | 2,802 | 3,289 | 316 | 2,248 | 2,564 |
| July | 5,118 | 3,470 | 8,588 | 3,077 | 1,686 | 4,763 |
| August | 3,089 | 6,143 | 9,232 | 1,774 | 3,081 | 4,855 |
| September | 1,538 | 952 | 2,490 | 698 | 271 | 969 |
| October | 2,468 | 813 | 3,281 | 342 | 156 | 498 |
| November | 666 | 661 | 1,327 | 337 | 292 | 629 |
| December | 567 | 1,675 | 2,242 | 112 | 1,270 | 1,382 |
| TOTALS | 68,848 | 59,735 | 128,583 | 42,231 | 37,867 | 80,098 |

TABLE IV

Average Number of Fish Caught per Haul in Trawls by the Black Mallard

| | All Fish | | | Commercial Fish | | |
|---|---|---|---|---|---|---|
| 1932 | Total | Inside | Outside | Total | Inside | Outside |
| January | 395.5 | 395.5 | ...... | 128.3 | 128.3 | ...... |
| February | ...... | ...... | ...... | ..... | ..... | ...... |
| March | 502.3 | 605.8 | 191.3 | 386.4 | 472.2 | 129.3 |
| April | 143.3 | 172.8 | 99.3 | 26.8 | 38.0 | 10.0 |
| May | 346.6 | 267.7 | 457.0 | 238.3 | 207.8 | 283.1 |
| June | 561.3 | 482.9 | 679.3 | 486.1 | 420.1 | 584.2 |
| July | 453.2 | 220.7 | 627.6 | 339.6 | 186.8 | 454.3 |
| August | 501.9 | 400.7 | 738.0 | 371.3 | 293.3 | 600.0 |
| September | 1,003.3 | 553.0 | 1,528.6 | 620.1 | 136.3 | 1,184.5 |
| October | 516.1 | 228.3 | 947.9 | 341.2 | 78.3 | 735.4 |
| November | 162.0 | 99.3 | 256.0 | 75.3 | 19.8 | 158.5 |
| December | 207.1 | 178.1 | 294.0 | 62.3 | 38.6 | 133.7 |
| 1933 | | | | | | |
| January | 150.7 | 161.7 | 139.7 | 40.1 | 49.4 | 32.1 |
| February | 233.4 | 220.9 | 252.0 | 96.7 | 94.6 | 99.8 |
| March | 319.9 | 373.5 | 239.5 | 176.2 | 266.4 | 40.8 |
| April | 476.0 | 623.4 | 273.4 | 351.7 | 503.1 | 143.5 |
| May | 986.5 | 1,073.0 | 214.0 | 815.6 | 894.9 | 102.0 |
| June | 365.4 | 81.2 | 934.0 | 284.9 | 52.7 | 749.3 |
| July | 613.4 | 511.8 | 867.5 | 340.2 | 307.7 | 421.5 |
| August | 615.4 | 441.3 | 767.9 | 323.7 | 253.4 | 385.1 |
| September | 276.7 | 256.3 | 317.3 | 107.7 | 116.3 | 90.3 |
| October | 328.1 | 352.6 | 271.0 | 49.8 | 48.8 | 52.0 |
| November | 132.7 | 95.1 | 220.3 | 62.9 | 48.1 | 97.3 |
| December | 249.1 | 94.5 | 558.3 | 153.6 | 18.7 | 423.3 |

## CREOLES AND PELICANS

*By Susan Sherrill*

In the history of Louisiana there is every emotion of the human soul.

From the coming of DeSoto the history of Louisiana has been a story of vision, hope, faith, courage, bravery, fortitude, patience, and perseverance.

Hand in hand with these walked war, piracy, intrigue, pestilence, hunger, danger, hardship, suffering, fear, misery, despair, and death.

But by the side of all of these there has been romance, chivalry, gallantry, pomp, splendor, glory, love, beauty, and charm.

And out of it all there has come accomplishment and success and the development of a Great Commonwealth.

The vast territory known as Louisiana was a colony of France from 1699 to 1762 when France ceded it to Spain.

By the Treaty of St. Ildephonso, in October, 1800, Spain ceded Louisiana back to France.

In 1803 Louisiana was purchased by the United States of America and in April, 1812, was admitted to statehood.

When Louisiana was purchased from France a majority of her citizens were of French or Spanish extraction and were commonly spoken of as "Creoles" and when Louisiana was admitted to the Union it soon became known as the "Creole State".

The term "Creole" has been generally misunderstood and misused and has been the subject of many arguments between historians, and writers, and many explanations of the word have been given. At one time the misuse of the term became so serious that, on April 25, 1885, Charles Gayarre, eminent scholar and great Louisiana historian, delivered an address at Tulane University, and selected as his subject, "The Creoles of History and of Romance." In this address Mr. Gayarre explained the origin and meaning of the word "Creole", as follows:

"In every nation the human language has modified itself in the course of time. The spelling and pronunciation of many words have changed; their original meaning has frequently become obscure and misapplied. But few have met so striking a transformation as the word Criollo in Spanish, Creole in French.

"According to the definition given by the dictionaries of the French and Spanish Academies, which, as to language, are of as much final authority as the Supreme Court of the United States in matters of law, Creole means the issue of European parents in Spanish or French colonies. It was first invented by the Spaniards to distinguish their children, natives of their conquered colonial possessions, from the original natives whom they found in those newly discovered regions of the earth.

"Criollo was derived from the verb Criar (create), and used only to designate the Spanish-created natives, who were not to be confounded with the Aborigines. This word by easy transition becoming Creole, from the verb, Crier, was adopted by the French for the same purpose—that is, to mean or signify a white human being created in their colonies of Africa and America.

"The exploring expeditions of Hernando de Soto in 1539, of Joliet and Marquette in 1673, and of LaSalle in 1682, left behind them no Creoles. Those heroic adventurers founded no colony, either French or Spanish, and had with them no white woman. The first colonists date from 1699, when two brothers, Iberville and Bienville, Canadians of noble birth and distinguished officers of the navy of France, formed a settlement in Louisiana. From that time to a later one there were six different classes of people in the Colony: The Europeans; the Creole, or issue of European parents; the Pure Indian; the Metis, or Mestizo, a cross between the White and Indian; the Griffe, preceeding from the African and the Indian; the Mulatto, from the White and African.

"When the first Creole of Louisiana was born, that is, the first native of pure white blood, Governor Bienville and Commissary Salmon thought it an event sufficiently important to make it the subject of a joint dispatch to the French government. His name was Claude Jousset, and he was the son of a Canadian, who was a small trader in Mobile."

Thus we learn that, though it has gradually become the custom to apply the word Creole to the French people of Louisiana, the term is not con-

(Continued on Page 62)

## TRIBUTE

(To Robert S. Maestri)

*Now and then, as time goes marching on,*
*A man is born who changes things a bit;*
*Who comes into this dull and dreary world*
*And somehow makes a better place of it.*
*We recognize, at once, his broad humanity,*
*We feel and know his purpose and intent*
*Are for his neighbors' good. And so we wish*
*To give him full and warm acknowledgement.*
*Then let us hail a LEADER, fearless, strong,*
*And let us highest tribute to him pay.*
*'Tis men like him, thoughtful, honest, true—*
*'Tis men like him who DARE and CLEAR THE WAY.*

—Estelle Verjie Cottman.

# The Termites of Louisiana and their Control

By THOS. E. SNYDER,

Bureau of Entomology and Plant Quarantine, United States Department of Agriculture

*Introduction*

Termites are not confined to the Tropics but are found in all warm and temperate regions. They excite interest not only because they are exceedingly destructive, but also because they are social insects, living in communities under a caste system with diverse duties performed by the different forms—the sexual forms (fig. 1, *a*; fig. 2), the workers (fig. 1, *b*), and the soldiers (fig. 1, *c*). Termites are sometimes called "white ants," since they resemble ants and live in colonies, but they can be readily distinguished from the true ants because they do not have the characteristic slender "waist" of the ants.

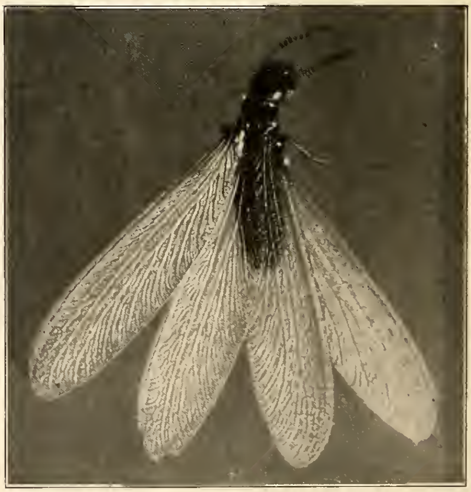
The life habits of termites are exceedingly interesting. Not only the winged forms (fig. 1, *a*), but even the workers and soldiers have sex differences, although in the case of these last two castes the sex organs are not developed and do not function. The reproductive forms are not all alike. There are found queens (fig. 2, *a*) that have developed from winged adult females and also other egg-laying females (fig. 2, *b* and *c*) that have been developed as substitutes from young termites, and for each of these female types there is a corresponding male. A number of publications dealing with the biology of these insects are listed at the close of this paper, and these can be consulted by any one wishing to know more about the colony life and its activities. This paper will deal primarily with the ways in which termites injure buildings and what can be done to remedy or prevent this damage.

The chief food of termites is cellulose, which they obtain from both living and dead vegetation. In the intestines of most termites are found a fauna and flora of great diversity in enormous numbers. Protozoa including flagellates, amoebae, and spirochaetes, and also fungi occur. The protozoa contain enzymes which digest the cellulose of wood for the termites, and without the flagellates the termites cannot live. The role of the amoebae and spirachaetes in the intestines of termites is not as yet well known. The fungi furnish termites with nitrogen so necessary to all animal life.

Termites are among the few forest insects that attack both living and dead trees; in the United States, however, their destructive role in the forest is a minor one. In the temperate regions termites do some good in reducing forest litter to enrich the soil, and in the Tropics termites aerate the soil by burrowing through it and turning it over in constructing their nests, as do earthworms in temperate regions.

Termites are of two very different types. One kind is subterranean in habit, attacking wood indirectly from nests in the soil. Moisture is so necessary to the life of such termites that they must always maintain contact with the soil. The others are the dry-wood or non-subterranean termites, which do not burrow in the ground but attack wood directly, and these can live in dry wood containing less than 15 percent of moisture.

Of the 58 species of termites occurring in the United States, 5 are found in Louisiana, 3 of the dry-wood type and 2 subterranean. The parts of the United States in which these five species are found are indicated in figure 3, the insects in each case occurring only south and east of the heavy line. The five species found in Louisiana will be briefly described.



A

Fig. 1. The subterranean termite RETICULITERMES FLAVIPES. (A) Winged adult, enlarged approximately 8 times.

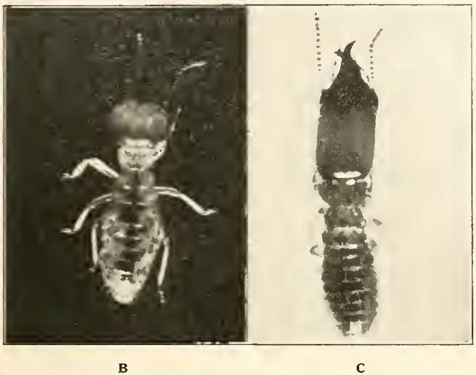


Fig. 1. The subterranean termite RETICULITERMES FLAVIPES. (B) Worker, enlarged more than 9 times. (C) Soldier, enlarged more than 9 times.

*Kalotermes approximatus* Snyder

This is the only species of the eastern dry-wood termites having dark-colored, winged adults. It has as yet been found only in northern Florida, in New Orleans, and in southern Virginia. It occurs in dead trees, logs, and stumps, as well as in the woodwork of buildings. A wing of this species is shown in figure 4.

*Kalotermes snyderi* Light

This termite has the largest winged adults of any species in Louisiana. It is the most widely spread and injurious of the species of dry-wood termites occurring in the Eastern States. It damages not only the woodwork of buildings, but also both the bases and tops of telegraph and telephone poles. In nature it is found in dead trees, logs and branches. The adults are yellow brown.

*Cryptotermes brevis* Walker

This is the common powder-post termite. The winged adults are rather small light yellow-brown insects. This species is of wide distribution in the West Indies and Central and South America, but in the United States it is found only in southern Florida, New Orleans, Louisiana, and southern Mississippi. It has *never* been found in nature living in logs and similar places, but appears to be a house termite exclusively, damaging furniture and the woodwork of buildings. It has been known to destroy the woodwork and furniture in large hotels in the West Indies and in southern Florida, and the constant dropping of pellets from infested wood is an annoyance to people living in houses which it has invaded.

*Reticulitermes flavipes* Kollar

This subterranean termite (fig. 1), with blackish-winged adults, occurs throughout the Eastern States. It it found also in southern Canada, northern Mexico, and in Mediterranean Europe, especially in southern France. It attacks the woodwork of buildings, matrials stored therein, telephone and telegraph poles, posts, derricks, and occasionally living trees, shrubbery, flowers, and crops. It is a destructive termite since it weakens the foundations of buildings.

*Reticulitermes virginicus* Banks

This species, a smaller subterranean termite of more limited southern distribution, has habits similar to those of *R. flavipes.*

*Damage by Termites*

Throughout all of the States—especially in the Southern, Central, Southwestern, and Pacific Coast States—native termites, or white ants, may cause serious damage to the foundations and woodwork of buildings and to articles in the buildings (fig. 5). Damage by subterranean termites is much more common and generally more serious, structurally, than that caused by dry-wood termites (fig. 6). The control of dry-wood termites is not discussed in this paper because only slight damage is caused by them in Louisiana, but control methods are outlined in Farmers' Bulletin 1472 of the United States Department of Agriculture.

Termites do not confine their attacks to woodwork alone but also attack any other articles containing cellulose, such as papers, books, clothing, shoes, linoleum on floors, and many other articles, as well as living vegetation. It is not because wood has been used as a construction ma-

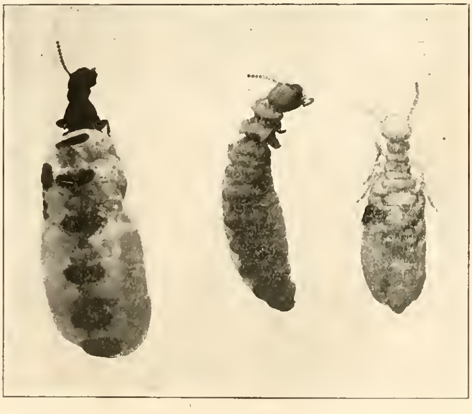


Fig. 2. RETICULITERMES FLAVIPES. The three types of egg-laying females, or queens, enlarged approximately 2 2/3 times (A) Developed from the winged adult; (B) and (C) developed as substitutes from young. Since the latter forms (B and C) are available in case of the loss of the normal queen, the destruction of the queen will not result in the death of the colony.

terial that buildings are subject to attack, but because the wood has been improperly protected.

### *Caution against Exaggerated Fears*

With no desire to minimize the damage that may be occasioned to buildings and contents from termite attack, especially if long continued, it should nevertheless be pointed out that, particularly in the more temperate climates, termite work may go on for years without involving the necessity for extensive repairs or reconstruction of foundation timbers or flooring. In many instances the actual damage is only slight and can be easily remedied. Cases of sudden collapse, strictly from termite injury, of any fairly well constructed buildings are very rare in the United States.

Once having invaded a building, however, termites will continue their work and extend their damage unless, and until, their means of entrance from the outside has been broken by effective reconstruction. With the breaking of the connection between the building and the external soil moisture, all the termites in the building promptly die, and injury ceases.

### *Increase in Termite Damage*

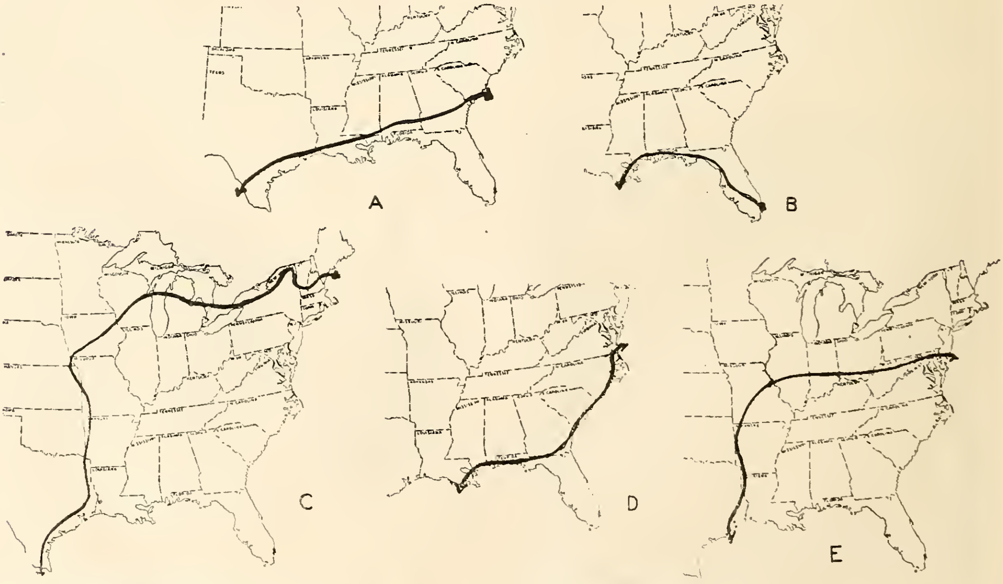
Termites have occurred in this country since long before the coming of man. They are not spreading geographically, but in many places they are attracting greater attention because of their damage to buildings. With the invasion by man of their natural habitat in forest and field, they turn to buildings and the contents of buildings to obtain the cellulose which is their natural food. Actually the elimination of forests and the cultivation of large areas has probably reduced the numbers of termites. There has been no spread of termites from the Tropics to our country or from the Southern to the Northern States.

### *Prevention of Damage Easily Obtained*

Periodic inspections (at least once a year) of the foundations of buildings, the removal of all wood debris from underneath buildings, and the breaking off of any earthlike shelter tubes constructed over foundations are often all that need be done to insure protection from termite attack. This is particularly true in the Southern States, where buildings are built up off the ground on masonry foundations.

### *How to Detect the Presence of Termites*

The emergence of large numbers of flying termites in the spring or fall is a warning that the woodwork is infested, and the point of emergence indicates the approximate location of infested timbers. The first species to fly in Louisiana is *Reticulitermes flavipes.* This early-swarming termite is usually flying out of doors during the day from about the first to the middle of March.



A. KALOTERMES APPROXIMATUS Snyder.
B. KALOTERMES SNYDERI Light.
C. CRYPTOTERMES BREVIS Walker.
D. RETICULITERMES FLAVIPES Kollar.
E. RETICULITERMES VIRGINICUS Banks.

Fig. 3. Within or south of the heavy lines are the regions in which the termites of Louisiana have been found or probably occur.

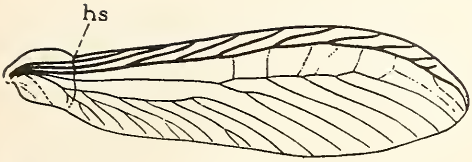


Fig. 4. **KALOTERMES APPROSIMATUS.** A forewing to show the suture (hs) where the wing breaks off after the few hours' flight period, and the cross veins in the upper area that are not found in the wings of subterranean termites. Enlarged 10 times.

*R. virginicus* next appears from the middle of April to the first of May. *Cryptotermes brevis* appears in scattering numbers, attracted to lights in buildings, from the middle of May till the first of July. *Kalotermes snyderi* flies from the middle of May to the last of June; it is attracted to lights. *K. approximatus*, the last termite to fly, appears in July. Sometimes there are also flights in the fall in the case of the subterranean species.

The presence, on the foundations, of small branching shelter tubes of earth mixed with excreted wood, constructed by termites, is another sign of infestation (fig. 5, *d*).

### *Termite Damage to Buildings Due to Improper Construction*

Most of the damage caused to buildings by subterranean termites is due directly to improper types of construction. Despite popular opinion, the age of the building does not determine whether or not it is liable to termite attack.

Furthermore, it is not the kind of construction material but the manner in which it is utilized that will lead to or prevent termite damage to buildings. Wood, masonry, concrete, brick, hollow tile, stucco, and even rammed earth can be effectively used so that the building will not be attacked by termites. Buildings are often erected with untreated timber foundations and other woodwork directly in contact with, or improperly insulated from, the ground, leaving the way open for the entrance of ground-nesting termites. Subterranean termites are not brought into buildings in lumber.

### *How Subterranean Termites Infest Buildings*

The principal conditions which make it possible for subterranean termites to get into buildings are as follows:

(1) The use of untreated or unprotected wood or fiber products in the basements or foundations of buildings, where termite damage is most likely to start;

(2) The use in foundations of low-grade mortar or of masonry with improperly filled vertical or horizontal joints, which enables termites to penetrate masonry walls and work their way up through the interior of the walls;

(3) The termites' ability to crawl through their earthlike shelter tubes over impenetrable walls and thus infest buildings.

### *Modification of City Building Codes*

One of the simplest, most effective, and practical means of preventing termite infestation is to modify building regulations or codes, as has already been done in many cities, so as to include in the mandatory section a few simple specifications recommended by the Bureau of Entomology and Plant Quarantine of the United States Department of Agriculture to protect buildings from damage by termites. In rural regions county agents will give helpful advice in interpreting and adapting these specifications.

Essentially, these specifications pertain to methods of keeping termites from coming up from the ground where they live and obtain moisture, and from burrowing into the untreated woodwork of buildings. This calls for the complete insulation of untreated woodwork from the ground. The adoption of the termite-proofing regulations is entirely a municipal problem; the Federal Government can act only in an advisory capacity. The recommendations are as follows:

(1) No untreated or unprotected wood shall be used in foundations, basements, or cellars or within 18 inches of the ground.

(2) Cement mortar, with not more than 10 percent (by weight) of lime, shall be used in masonry foundations.

(3) All masonry foundations shall be capped with at least 2 inches of concrete, or mortar and slate.

(4) Noncorrodible metal mechanical barriers shall be placed over foundations, especially interior walls, piers, piping, etc. (The metal strips are inserted over masonry, extend out 2 inches horizontally, and are bent down for an additional 2 inches at an angle of 45°. The corners are soldered or crimped.)

(5) Proper ventilation shall be provided for by having at least 2 square feet of clear open area per 25 lineal feet of foundation wall.

(6) All ventilation openings and doors shall be screened with 20-mesh noncorrodible screen.

(7) Earth shall not be used as a filler for the foundations of porches or sun parlors adjoining houses unless these are insulated from the buildings by a concrete or metal apron.

With the exception of the metal termite shield, these methods of construction should be followed in any sound building program, even if termites are not considered. (See figs. 7, 8, and 10).

*Repairs to Damaged Buildings*

Knowledge that termites infesting beams or other wood, even to the upper floors, will dry up and die if all wood is disconnected from the ground will save time and expense, especially in the case of repairing old frame buildings, where extensive repairs would be unwarranted. Eaten timbers need not be removed or replaced, unless seriously weakened structurally or rendered unsightly. Wooden floors laid directly on the ground, or on stringers on the ground, should be removed. There should be a solid layer of concrete between the earth and the wood. Wooden sills and baseboards should be removed if not on concrete.

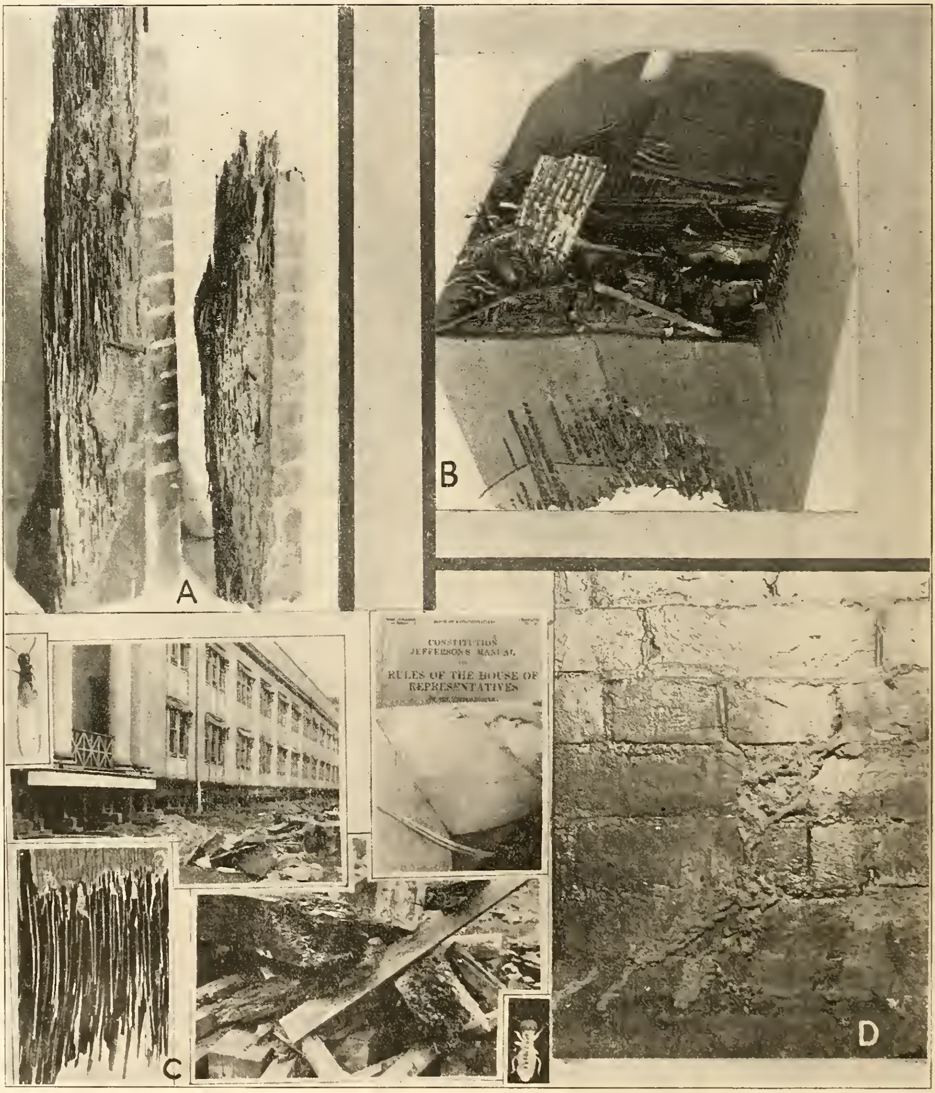


Fig. 5. (A, B, C) Damage to timber and contents of buildings by subterranean termites. (D) Earthlike shelter tubes constructed by termites over impenetrable foundations.

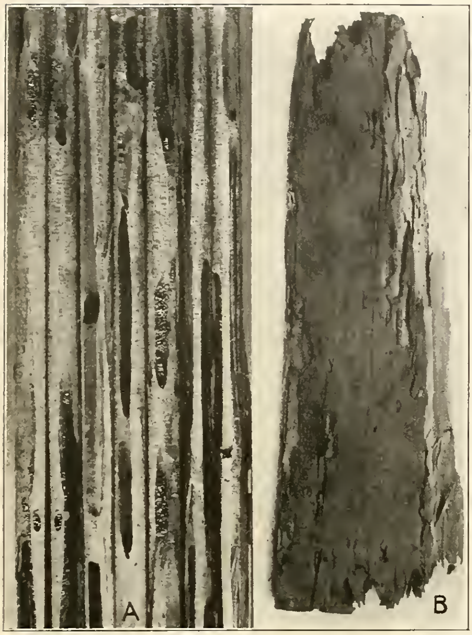


Fig. 6. Damage by the dry-wood termite CRYPTOTERMES BREVIS to furniture in a building; note pellets of excreted wood in the burrows.

### *Soil Poisons*

Where the reconstruction methods just recommended are deemed by the owner to be impracticable or too expensive, the following type of soil poisoning may be used in all unexcavated areas under the building, and this should give at least temporary relief:

Remove all wood debris and break off all earth-like shelter tubes over foundations; dig a trench 30 inches deep (but in no case lower than the top of the footing), and at least 12 inches wide at the top, around the foundation walls and piers; saturate the soil at the bottom of the trench with a mixture of 1 part of coal-tar creosote and 3 parts of petroleum oil at the rate of 1 gallon of this mixture per 10 linear feet; replace the soil, and repeat the treatment within 3 inches of the surface.

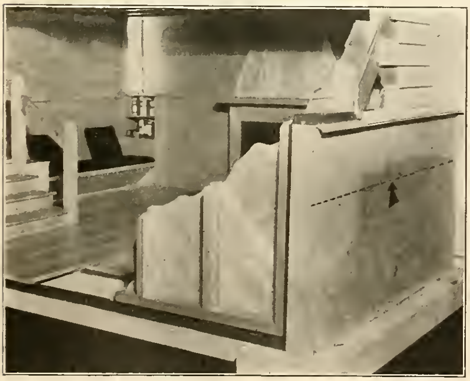


Fig. 7. Model of a termite-proof basement suitable for construction in the Northern States. Note the termite shield and the concrete floor with sills and stringers impregnated with coal-tar creosote. Arrow indicates ground line.

### *Cost of Termite-Proofing and Insurance Slight*

A few hundred dollars additional spent in the proper construction of buildings may save thousands of dollars later in repairs and replacements. It is much simpler to keep termites out of a building than to get rid of them and repair the damage after they are once in. Also it is cheaper, and the repairs needed where termites have been at work may be too costly to be undertaken by the small householder. Following out these suggestions for the prevention of termite damage to buildings will probably add only 1 or 2 percent to the initial cost of the buildings, but it will be a form of insurance, not only to the householder but to the persons financing the buildings.

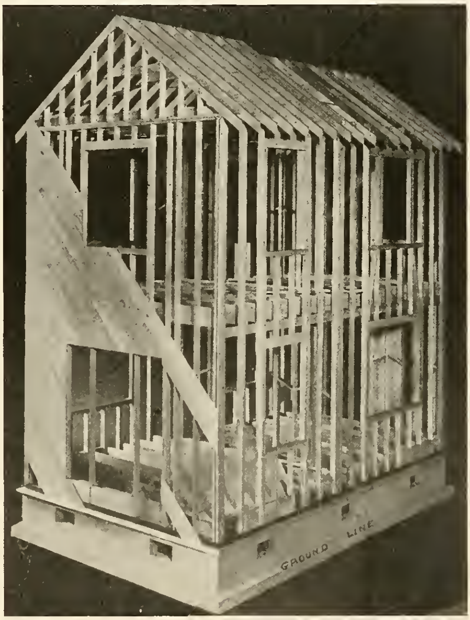


Fig. 8. A model of a termite-proof building suitable for construction in the Southern States. Note the metal termite shield and ventilation openings. Model constructed by the Southern Pine Association in consultation with the Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture.

It is a great hardship for a man on a small salary to buy a home on the installment plan, making a large initial payment, and then within a few years to be forced to spend several hundred dollars on repairs necessitated by termite damage. As a consequence, the householder may not be able to meet his monthly payments. Then his banker becomes interested; and it is discovered that, owing to ignorance of the destructiveness of our native termites, the dwelling was improperly built. The occurrence of a few such cases demonstrates to the banker that both he and the householder need some form of insurance. Financiers, being alarmed at the increasing amount of serious damage to buildings by termites and being anxious to protect their investments, have shown their willingness to loan more money or loan it at a lower rate of interest to a home-owner whose house is to be constructed in accordance with these termite-proofing provisions.

### *Federal Specifications for Preventing and Remedying Termite Damage*

The Bureau of Entomology and Plant Quarantine of the United States Department of Agriculture has prepared, for use by custodians of Federal buildings, sets of specifications for preventing and for remedying termite damage. These recommendations, issued as circulars E-338 and E-327 respectively, are based on four different types of structures. They are in mimeographed form and may be obtained from the Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, on request.

### *Publications Relating to Termites*

For the information of those who desire to have more complete information on termites and their control than is found in government publications, the following literature can be consulted:

1920. Banks, N., and Snyder, T. E.
A revision of the nearctic termites with notes on biology and geographic distribution. Smithsonian Inst., U. S. Nat. Mus. Bull. 108. 228 pp., 35 pls., 70 text, figs.

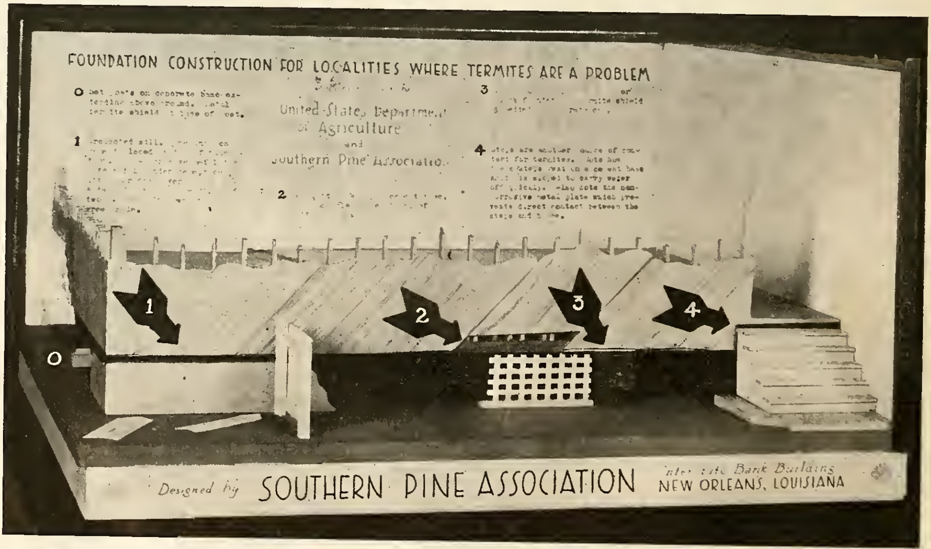
1926. Snyder, T. E.
The biology of the termite castes.
Quar. Rev. Biol., Vol. 1 (4), pp. 522-552, 15 figs.

1934. Kofoid, C. A. (ed.), and others.
Termites and termite control. 734 pp. 182 figs. University of California Press, Berkeley, Calif.

1935. Snyder, T. E.
Our enemy, the termite.
196 pp., 56 figs., 10 pls. Comstock Publishing Co., Ithaca, N. Y.

1936. Hunt, Geo. M., and Snyder, T. E.
An international termite exposure test. Seventh Progress Report, Proc. 32d Ann. Meeting of Amer. Wood Preservers' Assn., pp. 476-489. Memphis, Tenn.

1936. Turner, N., and Townsend, J. F.
Termite control in buildings in Connecticut. Conn. Agr. Expt. Sta. Bull. 382, pp. 209-242, figs. 78-92, New Haven, Conn.


FOUNDATION CONSTRUCTION FOR LOCALITIES WHERE TERMITES ARE A PROBLEM
United States Department of Agriculture
and
Southern Pine Association
0
1
2
3
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Designed by SOUTHERN PINE ASSOCIATION
NEW ORLEANS, LOUISIANA

Fig. 9. Model showing three types of masonry foundation for frame buildings constructed by the Southern Pine Association in consultation with the Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture.
0. Wooden post on concrete plinth and metal termite shield.
1. Metal termite shield inserted over concrete foundation. The wooden fence should be isolated from the woodwork of the building.
2. Mud sill impregnated with coal-tar creosote.
3. Metal shield over concrete capping on brick foundation pier.
4. Wooden steps separated from woodwork of building by a metal sheet, and resting on a cement base.

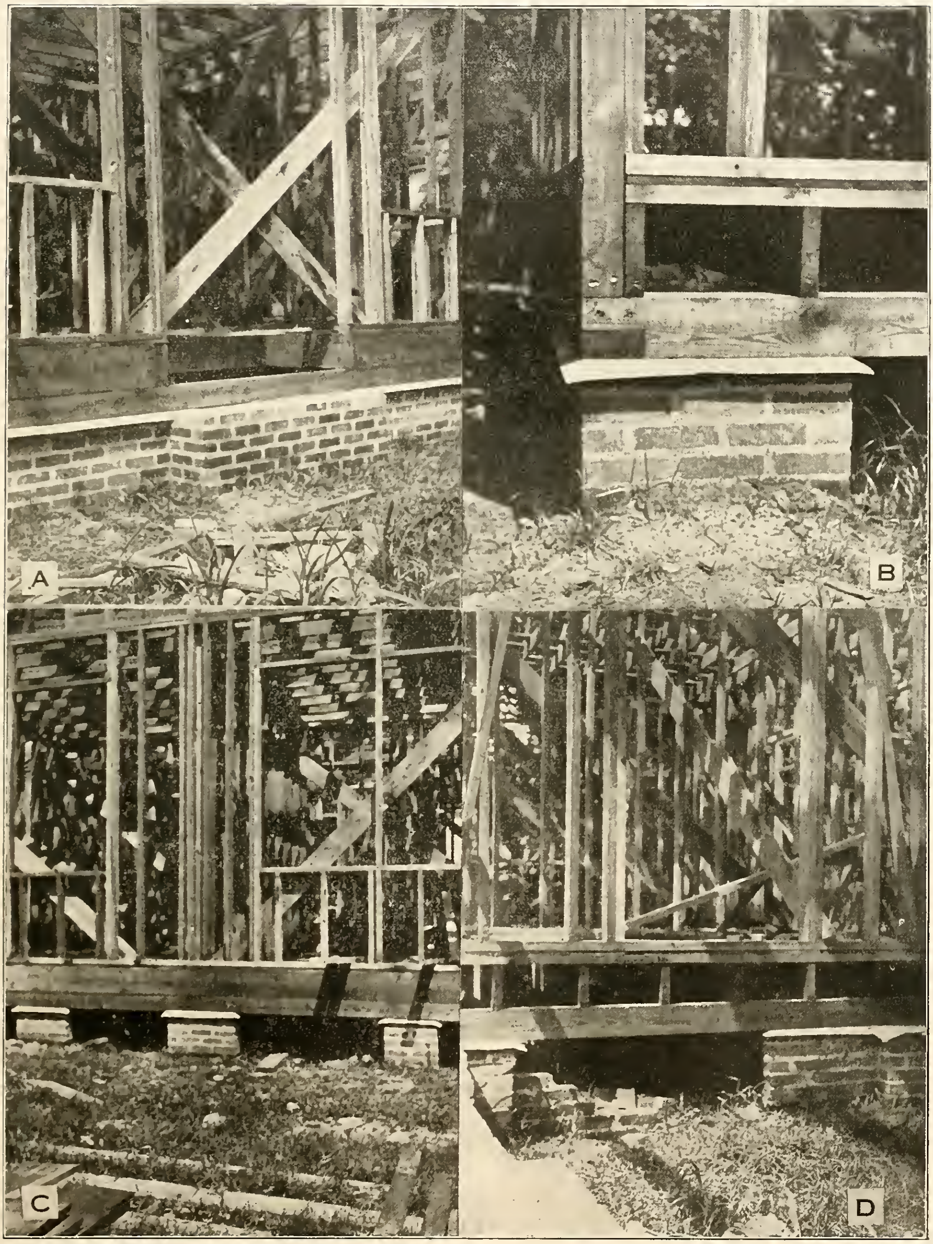


Fig. 10. Improperly installed metal termite shields on building at New Orleans, La., September 22, 1936. (A) Unprotected entrance without shield and untreated mud sill; (B and C) No concrete capping on brick foundation wall and shield extending out horizontally only ½ inch; (D) Poor connection of shield at offset in uncapped wall.

Library
Louisiana State University

# Some Wild Flowers of Louisiana

## Part VII

## *Poisonous Plants*

By
CLAIR A. BROWN
Associate Professor of Botany, Louisiana State University

When nature slipped her potent brews into the stems, leaves, flowers and fruits of a large variety of plants, she did not mark them with the familiar skull and crossed bones. So man and beast have had to learn by trial and error that certain ones are poisonous and must be avoided. These poisonous members are found in almost all plant groups from the lowly microscopic bacteria and conspicuous mushrooms (their loathesome qualities indicated by the name "toadstools") to the higher ferns and flowering plants that are frequently cultivated in our gardens.

Poisonous plants and plant poisons are fascinating subjects for the writers of detective fiction and are no less interesting to the majority of people who daily come in contact with them. Public interest usually centers around the more potent poisonous plants which are responsible for the suffering and death of live stock and humans, or the cures for the dermatitis and allergic troubles caused by plants and their products.

It is interesting to note that many of our drugs which, in small amounts, are beneficial in curing various ailments, are in themselves poisons in large quantities. Cinnamon, wintergreen, cloves, peppermint, spearmint, thyme, nutmeg, horseradish, mustard, allspice, and black pepper contain poisonous volatile oils which, in small quantities, are used as condiments in seasoning our food or in flavorings for our medicines. Many drugs derived from plants, such as opium, tobacco, cocoa, atropine, quinine, strychnine, and aconite contain or consist largely of poisonous alkaloids. It is even more astonishing to learn that many of our ornamental plants, cultivated for their beautiful flowers or foliage, contain poisonous compounds. The Bracken, Oleander, Black Locust, Elderberry, Nightshade, Snow-on-the-Mountain, Larkspur, Monk's Hood, and Privet are a few familiar examples.

Some common crops, particularly Johnson Grass, Sudan Grass, and Sorghum are poisonous to live stock under certain conditions. Cotton seed meal, when fed in large quantities over long periods of time, has proven poisonous to cattle. Environmental conditions often influence or modify the toxic or poisonous properties of these plants. Some plants are poisonous under some conditions but perfectly harmless under others. Some of these conditions are the climatic and seasonal changes, type of soils upon which the plants are growing and the age of the plants.

Poisonous plants can be grouped into three main groups; first, those which must be ingested in order to be harmful; second, those which produce dermatitis when handled; and third, the ones which produce an allergic reaction.

One of the poisons commonly formed in plants is hydrocyanic acid (prussic acid). This is usually produced from cyanogentic glucosides by the means of enzymes. Some of the common hydrocyanic acid producing plants are Black Cherry (*Prunus serotina*) Cherry Laurel (*Prunus caroliniana*) (Figure 1), Velvet Grass (*Holcus lanatus*), Johnson Grass (*Sorghum halepense*), Sudan Grass (*Sorghum halepense sudanensis*), Sorghum (*Sorghum vulgare*). In Sorghum and related plants the hydrocyanic acid is not found in any dangerous quantity when the plants are healthy and growing normally. It usually occurs most abundantly in plants that have been injured by frost, trampling, or drought conditions. Plants grown on poor soil usually develop less hydrocyanic acid than those grown on fertile soil. Plants grown under northern conditions tend to develop more of this poison than the same species in the South. Symptoms: Hydrocyanic acid acts very quickly, frequently killing the animals in a few minutes although some may live for several hours. A brief period of stimulation is followed by depression and paralysis. Stupor, convulsions, and difficult breathing result from the action of the poison. Death is caused by respiratory paralysis. In experimental tests, it has been found that as little as one and a half pounds of Choke Cherry leaves (*Prunus demissa*) is sufficient to kill a 500 pound animal.

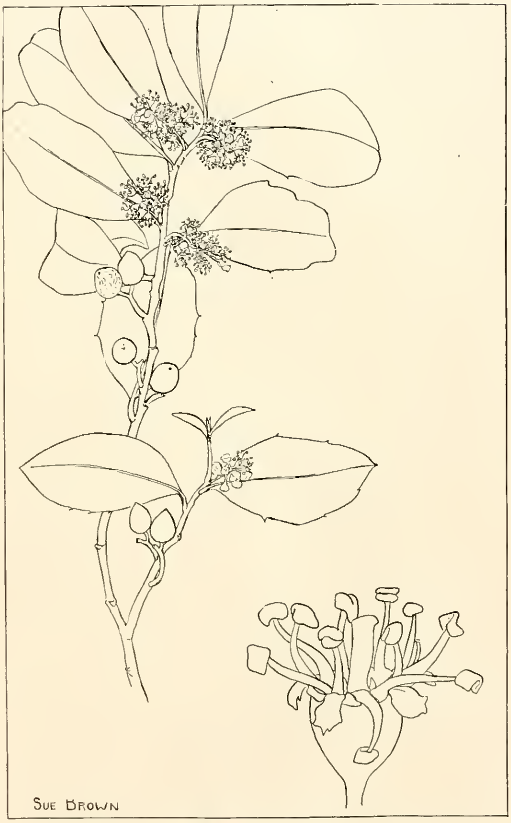
Fly poison, Crow poison (*Chrosperma muscaetoxicum*). This plant is a fleshy, bulbous herb with grass-like leaves at the base of a nearly leafless flowering stalk and with many flowers racemosely arranged at the apex. The flowers are whitish at first and turn yellowish to greenish with age. The ovary develops into a three lobed fruit united below the middle. It blooms from May into June. The plant occurs in the Florida Parishes* and may be found in the pine hills of central and western Louisiana. The roots and leaves contain a very toxic alkaloid, poisonous to cattle.

Pokeweed, Pokeberry (*Phytolacca Americana*). This robust, much-branched plant grows from three to ten feet tall. The stem and branches are clothed with ovate to ovate-lanceolate leaves. The small flowers are white or flushed with pink and arranged in terminal raceme-like clusters. The purplish fruits are about three-eighths of an inch in diameter, slightly flattened and very juicy. The plant blooms from May until frost. It is widely distributed throughout Louisiana, especially in waste places, cultivated fields and newly cleared land. The young shoots are used to make poke salad or for poke greens but care must be taken not to include the roots which contain a deadly poison. The fruits are readily eaten by birds but the literature contains numerous instances where children have died from eating the berries. The juice of the berries is used to make a red ink.

Snow-on-the-Mountain (*Lepadena marginata*). This species is so widely used as an ornamental that it is not necessary to describe it but attention should be called to the fact that the leaves are poisonous when eaten as well as to the touch. Young children have been poisoned by eating a few leaves. For this reason it is unwise to use it as an ornamental. It also may become a serious pest because it spreads so rapidly. It is particularly abundant in western Louisiana along Highway 171 between Many and Lake Charles.

Flowering Spurge (*Tithymalopsis corollata*). This species likewise has a reputation for causing dermatitis on contact with the milky juice and for being poisonous when eaten. It is widely distributed in Louisiana.

Jimson Weed, Jamestown Weed, Thorn Apple, Apple of Peru (*Datura Stramonium*). This is a large, robust annual with ovate to elliptical leaves, the margins of which are sinuate to laciniately toothed. The large flower is solitary in the axils of the leaves. The united corolla is from 3 to 5 inches long, frilled at the margin, and is colored white to lavender. The fruit is a green capsule two to three inches long, covered with prickles. It blooms from May until frost. It is widely distributed in Louisiana around barnyards, roadsides, and waste places. Cattle very seldom eat it on account of the unpleasant odor and taste. The seeds are more poisonous than any other part, but children have been poisoned



**CHERRY LAUREL, MOCK ORANGE, WILD PEACH**

**(Prunus caroliniana Alt.)**

**Rose Family** **Rosaceae**

This tree is used extensively as an ornamental because its dark, glossy, evergreen foliage is very attractive. Early in the spring its beauty is enhanced by the racemes of tiny, white flowers. These are eagerly visited by the bees for the abundant nectar which is produced before most other plants bloom. Birds eat the black fruit which hang on the trees all winter.

Hydrocyanic acid is formed in the twigs and leaves, especially when partially wilted, and is frequently fatal to cattle which browse it.

The tree often reaches a height of forty feet with a trunk diameter of twelve inches. In the open the tree develops a bushy, symmetrical crown, but in the forest it is often irregular and straggly. The evergreen leaves are a dark, glossy green, usually oblong in shape, with entire or spinulose serrate margins. The flowers occur in axillary racemes. Two types of flowers are produced, one complete and perfect; that is, with stamens, pistil, sepals and petals; the other staminate, or without a pistil. The staminate flowers are the most abundant. The fruit is a black drupe with a thick skin, thin flesh, and leathery stone.

It is widely distributed in Louisiana.

The flowers open about the middle of February and the fruit matures in the fall and much of it remains on the tree until the following spring.

Explanation of Plate: Branch with flowers and fruit about one-half natural size. Individual flower about five times natural size.

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*[Editorial Footnote: The "Florida Parishes" of Louisiana, so named because they once formed part of Spanish Florida and were ceded by Spain, lie to the east of the Mississippi River and roughly north of Lake Pontchartrain. They include West Feliciana, East Feliciana, St. Helena, East Baton Rouge, Livingston, Tangipahoa, Washington and St. Tammany Parishes. This explanation is probably necessary since the term Florida Parishes is an extremely confusing one to people outside of the State of Louisiana.]

by sucking the flowers. The symptoms of poisoning are headache, nausea, dry, burning skin, extreme thirst, dilated pupils, a loss of sight and voluntary movement followed by convulsions and death. This plant can be readily eradicated as all that is necessary is to pull up the plants or prevent them from flowering.

Bracken (*Pteris latiuscula*). This common fern can be recognized by the coarse brown to black stiff stipes, one to three feet tall, with three-forked bipinnate fronds. The sori are marginal and each is covered with the continuous indusium formed from the enrolled margin. It is widely distributed in the pine woods sections of Louisiana. "Fern staggers" is caused by feeding upon this fern. When sufficient material is eaten, death results from internal hemorrhage. Stock do not eat the fern usually, unless forced to do so by the poorness of the pasturage or by its presence in hay. Ferns should not be cut for hay. Apparently toxicity varies in different seasons and in different parts of the range and under certain conditions of the habitat.

Horsetail (*Equisetum* sp). Several species of horsetails are reported from other states as being poisonous. *Equisetum robustum*, illustrated in the *Louisiana Conservation Review* (Vol. 5, No. 1, page 13, figure 1, 1936) is the common species in Louisiana. There is no definite information concerning its poisonous nature in Louisiana. The symptoms of horsetail poisoning are unthriftyness, diarrhoea, and rapid loss of flesh, excitement, uncertainty of movement, followed by general paralysis, unconsciousness and death.

The Buttercup family, Ranunculaceae, has a large number of poisonous representatives. Perhaps none of these is serious in Louisiana. The Marsh Marigold (*Caltha palustris*), Green Hellebore (*Helleborus viridis*), Redbane Berry (*Actaea rubra*), Larkspurs (*Delphinium* spp.), Monk's Hood (*Aconitum* spp.), and Buttercups (*Ranunculus* spp.) are all recognized as more or less poisonous in various parts of the United States. Several species of Ranunculus occur in Louisiana and one of these, the Celery-leaved Crowfoot (*R. sceleratus*) is usually considered poisonous. The wild blue Larkspur (*Delphinium carolinianum*) which occurs in Washington, Grant, Rapides and Caddo parishes and probably elsewhere in the pine hills, must be looked upon with suspicion as so many of its relatives have proven poisonous elsewhere. About fifteen pounds of the poisonous western species will kill a 500 pound animal. Fortunately this species comes into flower in May and June and dies down while there is still an abundance of palatable forage in the fields.

Mandrake or May Apple (*Podophyllum peltatum*). This is a perennial herb, one to two feet tall, consisting of two umbrella-like leaves with single white flowers in the axils. The leaves are peltately attached and deeply lobed. The four to six white sepals soon fall after the flowers open leaving the corolla of six to nine white petals. The yellow fruit is an oblong, elliptical berry. It blooms from the latter part of March into May. It is known to occur in East Baton Rouge, Winn, Catahoula, and the Feliciana parishes and undoubtedly has a wide distribution in the State.

The fruit is edible, with a sweetish, sickish flavor. The rootstalk is used in medicine and it contains a cathartic principle. It usually is not grazed by cattle but when eaten its purgative properties are imparted to the milk and this is especially dangerous to infants. May apple poisoning symptoms are nausea, vomiting, purging, colic, bloody feces, convulsions and death.

Sickle Pod, Low Senna (*Cassia tora*). This plant is an annual herb frequently attaining a heighth of five to six feet. The alternate leaves are compound with four to six obovate leaflets. The yellow flowers are slightly irregular in shape and occur solitary or in clusters near the top of the plant. The four-sided pods are curved, four to six inches long. The plant blooms from June into October. It is widely distributed in Louisiana in cultivated fields and waste places, particularly abundant in the alluvial and pine hill soils. This species is readily distinguished from related plants by the curved pod and obovate leaflets. It is listed as a poisonous plant because the seeds are fatal to quail.

Cocklebur (*Xanthium* spp.). The well-known Cocklebur is widely distributed in Louisiana and is particularly abundant in the alluvial soils. It is most poisonous in the seedling stage from the time the cotyledons start to leave the fruit until after the second pair of leaves develop. It is fatal to hogs, sheep and cattle. The symptoms are general weakness with an unsteady gait, difficulty in breathing, nausea, vomiting, weak pulse and frequently spasmodic movements before death.

Oleander (*Nerium oleander*). This common ornamental is highly poisonous. One-half ounce of leaves is sufficient to cause death.

Privet (*Ligustrum vulgare*). Several species of Ligustrum are used for ornamentals in Louisiana. The seeds of this species are toxic and fatal poisoning of small children has been reported.

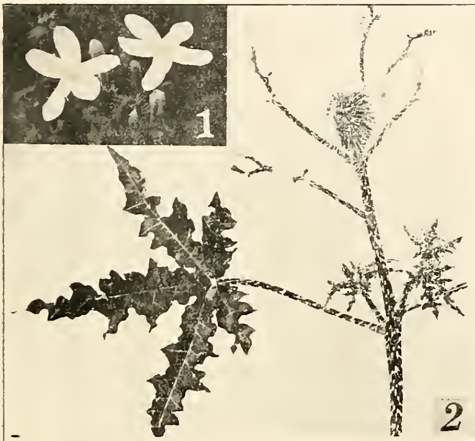
Mistletoe (*Phlorodendron flavescens*). The berries of this plant which is so widely used during the holiday season are somewhat poisonous and in a few instances have caused the death of children.

Elderberry (*Sambucus canadensis*). The bark of this common shrub contains a poisonous principle.

Black locust (*Robinia pseudo-acacia*). The bark and seeds of this tree are poisonous.

The most important plants in Louisiana which cause poisoning upon contact are Poison Ivy, Poison Oak, and Poison Sumach. Poison Ivy (*Rhus radicans*) (Fig. 3), frequently but improperly called Poison Oak in Louisiana, is ordinarily a vine which climbs over fences, up telephone poles, and trees by means of aerial rootlets. The stem varies from one-eighth to three or four inches in diameter and often attains a length of fifty feet. This stem can be distinguished from wild grape stems by means of the aerial roots. Branches which droop slightly extend from these stems and are often so abundant as to obscure the foliage of the supporting plant. The leaflets are in threes and very variable in shape and size. The yellowish flowers, although inconspicuous, occur in dense panicles. The greenish berries are quite noticeable.

The plant blooms from the latter part of March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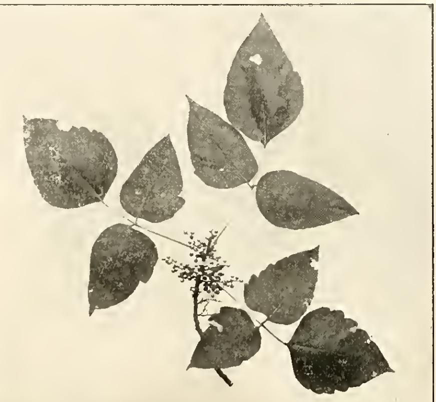
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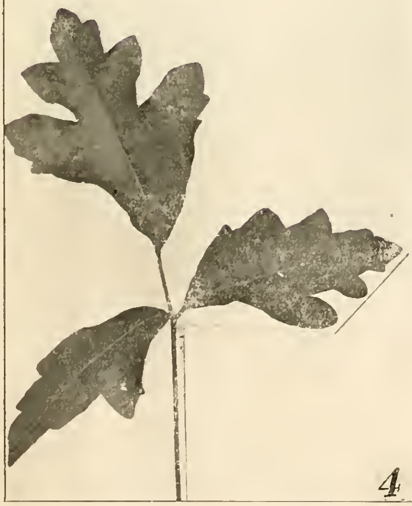
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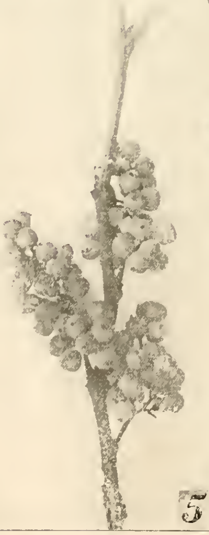
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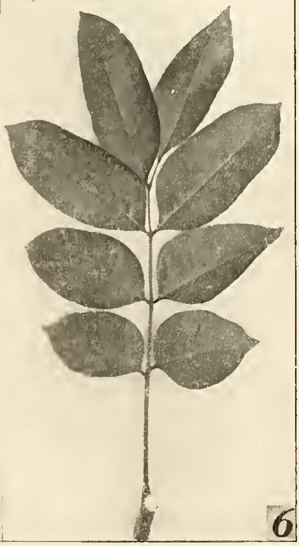
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Figures 1 & 2. Western Bull Nettle (*Bivonea texana.*) **Figure** 1 shows staminate flowers less than natural size. Figure 2 is approximately one-fourth natural size.

Figure 3. Poison Ivy (*Rhus radicans*) Fruiting branch about one-fourth natural size.

Figure 4. Leaf of Poison Oak (*Rhus quercifolia*) about natural size.

Figure 5. Fruit of Poison Oak (*Rhus quercifalia*) about natural size.

Figure 6. Leaf of Poison Sumach (*Rhus vernix*) about one-fifth natural size.

into the fall. It is widely distributed over Louisiana with its best development in the alluvial soils. It is absent from the salt marshes, except on the islands, cheniers and Indian mounds. Under conditions unfavorable for vine growth, it will grow into a small, bushy, herbaceous plant which dies back to the ground each year. This bush form can be distinguished from poison oak which produces woody, perennial stems.

Poison Oak (*Rhus quercifolia*). (Figs. 4, 5). This is a woody shrub from six inches to thirty inches tall. The trifoliate leaves are dark green, coriaceous, and usually evergreen. They are frequently lobed so as to be suggestive of young oak leaves. The inconspicuous flowers occur sporadically throughout the year. The yellowish-green fruits can be found from March to December. It is a common shrub in the dry pine hills of the Florida Parishes and in northern, central, and western Louisiana. It is apparently absent from the prairies of southwestern Louisiana and from the bluff and terrace soils which line the Mississippi river bottom lands. It does not occur on the alluvial soils.

Poison Sumach (*Rhus vernix*). (Figure 6). This is a woody shrub with stems one to three inches in diameter and up to 25 feet tall. The stems have a peculiar gray bark which, to the initiated, serves as a ready means of identification. The leaves are pinnately compound with seven to thirteen leaflets. The leaflets are entire, light green above and paler below, and about the size and shape of a shiny-leaved privet leaf. The rachis of the compound leaf is purplish red in color, which is a very distinctive feature. The greenish flowers are inconspicuous but the panicles of white fruits quickly attract the eye. The length of the blooming season is not definitely known for Louisiana, but it has been found in bloom in May and June, and usually most of the fruit is shed by the last of June. This plant prefers the moist bogs in the branch bottoms of the pine hills. It occurs in Washington, Tangipahoa, St. Tammany, Rapides, Winn and Vernon Parishes and probably elsewhere.

The poisonous compound of these three plants of the genus Rhus is a non-volatile oil, toxicodendrol, which occurs on the glandular hairs of the leaves and young stems of the Poison Ivy and Poison Oak and in the milky juice of all three.

Poison Ivy dermatitis. The first noticeable symptoms of dermatitis produced by Poison Ivy is a reddening of the skin followed by swelling. This is followed by the appearance of tiny, watery blisters. Accompanying these symptoms there is an intense itching which is very painful to susceptible people. Symptoms may appear within a few hours after contact with Poison Ivy or may remain latent for several days.

Preventatives. It is easier to prevent than to cure dermatitis produced by Poison Ivy and therefore susceptible individuals should avoid the plants. Many cases of poisoning result from a lack of knowledge of just what these plants are really like. Many believe that the Virginia Creeper, Pepper Vine, and Trumpet Creeper are responsible for the poisoning. The first thing to do is to learn to recognize the plants. In case one suspects that contact has been made with any of these plants, it will be helpful to wash the exposed parts thoroughly with a strong laundry soap. Careless washing may spread the infection.

Treatment. In cases of severe infection or infection around the face, it is best to secure medical aid. Poisoning on some people has been so severe as to place them in a hospital for months or may even result in death. A serum treatment has been developed which has given good results in severe cases. There are hundreds of so-called pet remedies which are effective for certain people and not for others. One of the older remedies is an alcoholic solution of sugar of lead. This will cure the infection about six times out of ten. There is, however, a possible danger of lead poisoning when the blisters are open. Ordinary baking soda gives some relief. Extract of grindelia and photographer's hypo have been useful in curing the infection. A three percent solution of potassium permanganate is not only useful after contact with the plants but is a good preventative. However, it stains the skin and retards the healing of open cuts. One of the most satisfactory remedies is a saturated solution of ferric chloride in 95% alcohol with an equal part of glycerine. A teaspoonful of this mixture to a basin of water makes a satisfactory lotion for washing. A variation of this formula, five percent. ferric chloride in 50 percent alcohol and 25 percent glycerine, is useful to sponge on the infected parts, but must be kept out of the eyes. Ferric chloride stains are difficult to remove from the clothing. From the chemical point of view, this remedy is very effective, as the ferric chloride emulsifies the non-volatile oil which is soluble in alcohol. The glycerine is added to prevent too rapid drying, thus allowing the alcoholic solution to penetrate the pores of the skin.

Inasmuch as Poison Ivy is a common vine around parks and dwellings, an effort should be made to eradicate it. It is best to secure someone who is not susceptible to the poisoning to uproot the plants. A pressure spray using three and a half pounds of table salt to a gallon of water will kill the foliage. Cut the vines before the foliage is out and apply salt or kerosene to the cut stems every two weeks until the plants are killed. Burning has been recommended to destroy the roots and stems but the smoke from the burning plants carries the oil and can cause severe poisoning, particularly in the respiratory organs. Many people are immune to poisoning and some who believed they were immune have been poisoned when they handled the plant under certain conditions. Under no circumstances should a person who is immune eat Poison Ivy to demonstrate immunity as several instances are known in which poisoning followed. One attack seems to make a person more susceptible instead of providing immunity.

The following plants cause intense discomfort for short intervals, either an itching or burning, and sometimes a rash.

Bull Nettle, Treadsoftly (*Bivonea stimulosa*). This is a perennial herb 10 to 16 inches high, with alternate, angular, palmately lobed leaves, sometimes entire, which are covered with stinging bristles. The flowers are monoecious, the staminate being without petals but the sepals of the five-lobed white calyx resemble petals. The pistillate flowers are inconspicuous, developing into a three-celled, three-ovuled capsule. The seed is about a half-inch long and mottled. The plant blooms from May into August. It apparently does not occur west of the Mississippi River. It is common in Washington parish in the cultivated soils of long leaf pine hills, and occasional throughout the cutover forests.

Western Bull Nettle (*Bivonea texana*). (Figure 2). This species closely resembles *B. stimulosa* but is larger, up to 30 inches tall. The leaves are more deeply three to five lobed and the entire plant is more densely covered with yellowish, stinging bristles. It blooms from May into August. The seeds are about an inch long, mottled, and have a nut-like flavor. It is widely distributed west of the Mississippi River in the pine areas in Lincoln to Caddo Parishes, south through Grant, Winn, Rapides into Natchitoches, Vernon and Calcasieu Parishes. Treadsoftly is an appropriate name for these plants as the slightest contact with the sharp bristles is followed by an intense pain and itching which frequently lasts for an hour.

"Nettle" (*Tragia urticaefolia*). This is a perennial, monoecious herb with stinging hairs. Stems are erect or ascending 12 to 18 inches tall. The leaves are alternate, ovate to lanceolate with truncate base and coarsely serrate margins. Staminate and pistillate flowers are inconspicuous. The plant blooms from May into July and is common in cultivated fields in the pine hills of north and central Louisiana. This plant is a close relative of the Bull Nettles and the poisoning action is similar but milder and lasts longer.

Stinging Nettle (*Urtica chamaedryoides*). This annual herb branches close to the ground and sends up several ascending or erect stems ten to twenty inches tall. The leaves vary in shape from ovate to deltoid, with truncated bases and crenate toothed margins. The upper leaves are much reduced in size. The foliage is frequently tinged with a purplish cast. The tiny, inconspicuous flowers are monoecious. The plant is sparsely covered with stinging hairs. It blooms from March into June, and is widely distributed in the alluvial soils.

Nettle (*Urtica diocia*). This is a perennial herb, often six feet tall, with a densely hairy stem, and ovate leaves incised on the margins. The plant starts to bloom in July and is widely distributed in Louisiana on moist sites and waste places. This species causes a painful, itching rash.

Spurge, Wild Poinsettia (*Poinsettia dentata*). This plant was described and illustrated in the *Louisiana Conservation Review* (Vol. 5, No. 3, 1936). Since the appearance of this article, several have mentioned that the milky juice poisons them.

Devil's Pin Cushion (*Leonotis nepetaefolia*). This introduced mint can be recognized readily by the large, globose clusters of orange-colored flowers scattered along a tall stem. The calyx lobes are ridged and the spine tipped. Contact with this plant results in white, raised spots on the skin.

The fine hairs of the fig leaves cause a rash very similar to nettle rash on many people.

Hay fever, or allergic reactions, are caused by pollens, dusts, fur and feathers. The reaction to pollens usually starts with a swelling of the mucus membranes of the nose and throat followed by rapid secretion of mucus. Occasionally the reaction to pollens is in the form of a skin rash or dermatitis similar to hives and other manifestations of protein poisoning.

Plants causing the allergic reaction are primarily those that shed large quantities of pollen. Wind pollinated plants include such groups as grasses, sedges, willows, hickories, oaks, pigweeds and many members of the Compositae. A detailed discussion of plants causing hay fever cannot be given at this time. It might be pointed out that the Giant Ragweed (*Ambrosia trifida*) is extremely abundant along the roadsides on the alluvial soils in Louisiana where it frequently attains a height of fifteen feet.

# NEREID TRAILS

## A Brief History of the Oleander--New Orleans' Official Flower

By **CATHERINE B. DILLON,**
New Orleans, La.

During the summer of 1923, within the walls of the beautiful, old, Greek, Gallier-designed New Orleans City Hall, the following municipal regulation was enacted:

"Mayoralty of New Orleans,
"City Hall, June 6, 1923.
"Calendar No. 7662.

"NO. 7395 COMMISSION COUNCIL SERIES

"AN ORDINANCE providing for the selection of the 'Oleander' as the City Flower for New Orleans.

"Section 1. Be it ordained by the Commission Council of the City of New Orleans, That the flower known by the botanical name of 'Nerium', commonly known as Oleander be and the same is hereby declared to be the City Flower of the City of New Orleans, and that the same, as such, may be displayed in the streets and parks of this city, and otherwise appropriately used as such.

"Section 2. Be it further ordained, etc., That this ordinance shall be effective from date of adoption.

"Adopted by the Commission Council of the City of New Orleans, June 5, 1923.

"GEORGE FERRIER, JR.,
"Clerk of Commission Council.

"Approved June 6, 1923,

"ANDREW J. McSHANE,
"Mayor.

"A true copy:

"F. C. FONT,
"Secretary to the Mayor."

Few know the oleander's legal status, fewer, still, its fitness to hold this place of distinction as the Creole City's official flower. Throwing little light on the subject, weighty definitions, mostly above the average head, when simplified indicate that the species *Nerium oleander*, an evergreen for indoor culture, is a Eurasian shrub with lanceolate, coriaceous leaves, erect, elongated follicles, and showy, clustered flowers. The string of fancy terms may be true enough, but that "indoor culture" is *much* too much! Aged oleanders in the backyards of Louisiana stand in evidence to the contrary. So, it is from sources far afield that the flower's story must be gleaned.

The oleander, formerly thought to be originally from the East Indies, is now definitely identified as a native of tropical Asia, particularly the Mediterranean Levant, Persia, India and Japan. From the Greek *Neros*, meaning moist, *Nerium*, the shrub's oldest name, is of the same derivation as *Nereid*, a sea nymph. In Greek mythology and ancient art, the Nereides, the fifty daughters of Nereus, god of the sea, and Doris, daughter of Oceanus, are depicted as graceful, swaying figures, moving in time with the rhythm of a calm sea's ripples. Although, generally described as beautiful mermaids with fishtails, sometimes, these mythical creatures are endowed entirely with human forms. As very important attendants of Neptune, they sang, played weird music, danced on the waves, and rode in splendor upon grotesque sea-horses, in magnificent, imaginary ocean pageants. In 1700, the shrub *Nerium*, as graceful and rhythmic as the most beautiful sea nymph conceivable, was re-named *oleander*, from the Latin *olea*, olive-tree. The form in general use is of Danish-Scandinavian origin.

*Nerium oleander*, the complete botanical name of the species was published in the famous treatise *Institutiones Rei Herbariae* (1700), by Joseph Pitton de Tournefort (1656-1708), distinguished French botanist and traveller, who during the reign of Louis Quatorze, in 1683, was appointed to the office of Professor of Botany at the Royal Plant Garden, Paris. Scientifically, oleander belongs to a group of herbaceous perennials, classified as the sub-tribe *Nerieae*, and the *Apocynaceae* or dogbane family. Dogbanes are so-called because they contain a milky, poison secretion powerful enough to kill a dog.

Three species of the genus are quoted. The very fragrant *Nerium odorum*, or Sweet-scented Oleander, grown in Japan, India and Persia, is not cultivated extensively, because it is not as hardy as the ordinary type. In the United States, oleander grows well throughout the warm sections of the South, particularly along the Gulf Coast from Florida to Texas. In Louisiana, except when damaged by severe weather, this evergreen maintains its beautiful foliage perennially. Whorled from the same node, on upright branches, the smooth, rigid, lance-like, dark green leaves are leathery in texture, and have prominent parallel veining. If the old foliage is killed by frost, new, pale green leaves spring out at the node scars.

*N. oleander* is found in double and single varieties. The terminal clusters, of which the fleshy, individual corolla is rose-like in form, are very decorative. One bunch is almost a bouquet. Numerous tints and shades have been developed. Besides white and a few light mottled types, the most familiar colors are cream, yellow, pinkish yellow, light salmon, flesh, pink, cerise, rose, vermilion, light and deep scarlet, crimson and a very dark neutralized red tone, bordering on mahogany. Some authorities include dark, rose purple which if true, is very unusual, for in color lists from prolific oleander areas, there is no mention of a purple variety. Those most frequently seen are white, cerise, rose and bright red. The latter, however, is uncommon in Europe.

In Southern Louisiana the oleander flowers in April. Single red and pale pink varieties bloom very early. The double white produces clusters of greater physical beauty than any other type. It also seems to be hardier under severe cold tests. The rose-colored double blossoms far into December. Long after Thanksgiving, sidewalk clumps of rose oleanders, if not as abundant as

The above photograph of an oleander tree in Jackson Square, New Orleans, situated in the heart of the Vieux Carre, was taken on the only morning in probably forty years when such a picture could be secured, for on that day there was, to the astonishment of everybody, a fall of snow.

in warmer seasons, are no less beautiful, maintaining flowers through Christmas, unless frost nips the buds. As the clusters are born during the year's growth of its branches, for the oleander flowers to attain their full beauty, the wood of the plant must be thoroughly ripe. If the tree is pruned every third year to prevent flowering, the bloom will be more abundant and lovelier.

A long, straight, narrow, lance-like, upright follicle or seed pod, rusty brown and woody in substance, is formed by the oleander blossom. Many, who have oleanders in their gardens, are unfamiliar with the contents of this pod. When fully ripened, the fruit vessel splits open along one side, revealing numerous tiny, fluffy ovules with brushy ends like bits of golden chenille. This downy pappus functions similarly to the winged keys or samara of the maple. The bristled plummage on its tip, wafting it lightly on the winds, enables the seed to fly like the thistle "wishes" children love to catch. Show the average person an oleander seed and he will call it an insect or a feather.

The oleander is propagated best through layering and cuttings. Evergreen propagation by cuttings and shoots is more difficult than that of deciduous shrubs. As a general rule, twigs that snap when bent are said to be in proper condition for producing new plants. A cutting, to which a part of the old wood should always be attached, must be about six inches long, with three or four inches near the end stripped of foliage. When placed in a bottle of water or wet sand, roots soon form. After these have developed sufficiently, the twig may be transferred to the soil. Cuttings set out in warm, well drained earth, should be kept reasonably shady and moist in hot summer weather. Early in spring, young shrubs, grown indoors in pots, should be uprooted and planted outside. Growing easily in the open, with little attention, the oleander will reach a height from seven to fifteen feet, usually ten. The tree thrives best in moist, lowland soil, but will grow on elevations, if a firm root-hold is attained, for it is found in high parts of the Himalayas. In a gardening book of 1889, this shrub is listed as "a greenhouse plant for parlor culture". In the North and cold climates, the oleander is grown as a tub or potted house plant, but in the South, it is decidedly for outdoor decoration. It is cultivated in warm climates as a tub plant for terrace and courtyard, but would probably grow out of bounds in a parlor.

Cold is the oleander's most treacherous enemy. If kept dormant in winter, old plants will survive the ravages of severe weather much more easily. Blight sometimes mars the bloom, and considerable damage is also caused by scale, mealy bugs, and, in parts of the southwest, by the insect known as the white fly. The latter attacks the foliage, leaving a scaly deposit that makes the tree droop and grow sickly. If not properly treated, it will soon wilt and die. An especially prepared spray or a strong soapsuds solution, applied carefully, will destroy the insect and thoroughly cleanse the plant.

Aside from its ornamental value, the oleander's practical uses are few. In Algeria, a charcoal made from its wood produces gunpowder, and, in some varieties, rubber is found. The shrub is for external, decorative use only, as every part of it is poison. The roots and bark are especially deadly. Persons and animals have been killed by eating the flowers and leaves, and death has also resulted from using oleander skewers in roasting. Even to cook or toast over its fumes is dangerous. Campers have been poisoned in this manner. Perhaps, because of the fatal fluid concealed beneath its loveliness, along with its membership in the dogbane family, which signifies "deceit", the oleander means "Beware!". Floral sentiments, however, are man-made trivialities, while the radiant charm this shrub possesses is a beautiful, God-given quality.

Of great antiquity, the oleander grows abundantly in the Orient, where it is the object of much admiration. The native Chinese name is *Chia Chu Táo*. *Chia* means narrow, *Chu*, bamboo and *Táo*, peach. It is so-called because its leaf is as long and narrow as a bamboo leaf, and its flower is as pink and as pretty as that of the peach. In Japan, oleander is called Kyochikuto, similar to the Chinese term, this, translated literally, means: "leaf resembles that of bamboo, and flower is like that of the peach."

In the oleander's native land, the Levant, which lies between the Mediterranean and the Euphrates, many prominent, Biblical places are located, and the plants of the section, often under erroneous names, are frequently mentioned in the Scriptures. A tree, translated in one version of the *Psalms* as "the green-bay tree", and in another as "the cedar", is said by some Scriptural interpreters to be really the rose-bay or oleander. The erect, upstanding oleander, spreading its glorious beauty with the proud air of a peacock, would serve effectively to convey the intended image, as the following translations suggest:

"I have been the wicked highly exalted, and lifted up like the cedars of Libanus." (Douay, Psalms, XXXVI—35).

"I have seen the wicked in great power, spreading himself like a green-bay tree." (King James, Psalms, XXXVII—35).

Introduced from Asia into other warm countries, *N. oleander* is now naturalized in all tropical and semi-tropical parts of the world. The Spanish name is *oleandro,* but in Spain it is familiarly called *"adelfa;"* and, while, the French form is *oleandre,* to France, the flower is the *"laurier-rose"* or *"rose-laurel."* Beneath Italy's sapphire skies, where the shrub, also known as *"oleandro"*, blooms in colorful abundance, it assumes an important role. There, in Tuscany, where Florence, the beautiful city of flowers, for centuries the center of Italian art and culture, has produced most of the world's religious painters, the oleander is "The Staff of St. Joseph". This custom originated through sixteenth and seventeenth century paintings influenced by the following legend of the Mediterranean countries, regarding the selection of Joseph as the spouse of the Virgin: When the fourteen-year-old Mary, because she had dedicated herself to the Lord, refused to return home from the Temple to be wed, the High Priest and Elders were perplexed. The law compelled virgins, brought up in the Temple, to marry, but Mary's vow was serious. Remembering the prophecies (Isaiah, VII—14; IX—6, 7) regarding the birth of a promised Messiah, the holy men asked God for guidance. The Lord commanded every unwedded man of the House of David to be made place his rod upon the altar. The staff of the man intended to be Mary's husband would bud, and in dove-form, the Holy Ghost would settle upon it. At the appointed time, while his kinsmen presented their rods, Joseph, thinking that he was too old for this sacred charge, stood aside. When no miracle occurred, and the Lord, in answer to the High Priest's query, indicated that the chosen one had not yet come forward, Joseph laid his staff upon the altar. Instantly, it budded and the Dove from Heaven descended upon it.

Some very early paintings of St. Joseph and the Marriage of the Virgin, adhering to this story, depict the saint holding a wand topped by a bunch of leaves, a small bud, or a single lily stalk upon which a dove poises. The lily, however has no connection with any particular saint. It is used in religious art as a symbol of chastity. Many sixteenth and seventeenth century artists tried to present the Virgin Mary's Wedding as accurately as possible. Details were given careful consideration. Since primitive times, a stick, made of some common native wood, obviously for defense or attack, has been carried in all nations. St. Joseph, being a gentle, peace-loving carpenter, probably used some simple cane suitable for protection against roaming animals. The oleander, with its reed-like branches from which flower clusters spring, seemed a most logical model. Numerous works appeared presenting St. Joseph's staff either as a flowering oleander branch stripped of its foliage, or a reed bearing white, pink or red flowers resembling oleanders. In some paintings, conical clusters, designed from oleander blossoms, emerge from whorls of lanceolate leaves, at the top of stiff looking wands. The tube-rose, gladiolus, dogwood flowers, and tall wooden knob-topped poles have also served in depicting St. Joseph's rod. Since the close of the seventeenth century, the lily has been the most frequently employed, but, still, in Italy, where the Virgin's spouse is patron saint, to the people of the Compartimento of Tuscany, the oleander remains "the Staff of St. Joseph."

No information is available on the introduction of the oleander into the United States. Many tropical plants were first brought to New Orleans by the Spanish. Oleanders, now growing in the city, are said to be descendants of cuttings from Havana. After the fires of 1788 and 1795, the town acquired permanence and beauty. During Baron de Carondelet's administration (1791-1797), the Spanish patio or courtyard came into being. Colorful oleanders greeted the passersby through stately grilled gateways and from behind the garden fences of quaint, little, set-back houses along *Calle Frente al Bosque,* "the street facing the woods", now Rampart.

A magnificent, tropical garden, established m 1835, by the N. O. & Carrollton Railroad, opposite its depot, near the tree-flanked levees in Carrollton, became famous as an early show place. Its collection of rare plants and beautiful flora was said to be one of the country's finest at that time. During the later nineteenth century it was known as Hickok's Carrollton Garden. Colonel Daniel Hickok, who managed the place, was called "the prince of entertainers." Another delightful garden was connected with the Elkin Club on Bayou St. John, at Spanish Fort. West End Park, with its Promenade and intricate, mystic maze, was also a popular nineteenth century beauty spot. In New Orleans, as a whole, concerted effort in floriculture was not made until the eighteen-eighties. Then, public parks took on a more colorful aspect—Jackson and Lafayette Squares were beautified—off-shoots of oleanders and other imported plants, long confined to exclusive gardens, were spread throughout the city to enhance the humblest yard and flourish abundantly along neutral ground and banquette. Today, the city's finest oleander display adorns the garden of the Archbishop's palace at Notre Dame Seminary.

In the Bermuda Islands, there are two opinions regarding the oleander's introduction. One claims that a Mr. Lightbourn, of Paget Parish, imported it in 1790 from Charleston. The other indicates that this shrub, long known as the "South Sea Rose", was brought from the South Sea Islands by a governor of Bermuda. Either may be correct; the former is generally accepted. Originally, the Bermudez Isles, this lovely coral cluster, lying a little less than six hundred miles east of the Carolinas, were discovered in 1511, by Juan de Bermudez, and settled a century later by the British Admiral, Sir George Somers, on a return voyage from Jamestown. Commercial intercourse with colonial America made it possible for rare plants, usually brought by corsairs into Charleston, to find their way to the Somers' Isles, as the group was sometimes called. The oleander increased rapidly in Bermuda. In 1804, from the window of a seventeenth century house, Thomas Moore, the Irish poet, sent as Registrar of the Bermuda Admiralty Court, viewed a breath-taking scene—a haven of tranquility, blending old England with an exotic, colorful, verdant, tropical setting, where under the bluest of skies, tiny, intriguing, coral lanes or garden paths, called "boreens" in Irish, meandered, between walls of flaming oleanders, down to the blue-green sea. Moore proved to be a better poet than a public official, for although he tarried only long enough to employ a deputy for whose embezzlements he was later held responsible, his impression of the Bermudian scenery survives in some beautiful lines of verse written home to a friend.

By 1850, the oleander was Bermuda's most popular decoration. All variations of this shrub, which blooms in April, are found on the islands, but the single pink is most commonly used. Today, forming hedges around homes, windbreaks for the fields, and walls for roads and highways, the oleander's bloom is so abundant that at the height of its flowering season, from far out on the ocean, Bermuda makes a rose-tinted splotch against the horizon.

Despite Bermuda's data, Charleston adds nothing to the oleander's story, but, nearer home, the plot thickens! Between 1804 and 1817, on Grand Isle, famed in pirate lore, a slender strip of seaward-sloping, glistening beach sands, where rows of many hued oleanders sway to the surf's booming, roaring music, Jean Lafitte is reputed to have held secret conferences and stored his wares in a house secluded by a brilliant rose-clustered oleander clump.

Across the Gulf, a hundred and fifty miles, is Galveston—formerly Little Campeche, headquarters of Lafitte from 1816 to 1821. This surf-bounded Texas port is known as the "Oleander City". Corsairs are said to have brought the first plants from the West Indies. The shrub grows with little care throughout the island and blooms in great profusion. Many Galveston clubs make planting oleanders their chief purpose. The Women's Civic League keeps a full-time gardener growing cuttings for public distribution. The city has developed twenty-eight distinct varieties, single, double and irregular in formation—their myriad flowers, ranging through fourteen hues, from pure white to deep scarlet, reflect the history of Galveston's colorful past.

South of Galveston, six hundred miles away, near the coast of Yucatan, the ancient Mayan stronghold, where other oleanders bow to warm gulf winds, lies the tiny Isle of Mujeres, said to have been Lafitte's last base of operations.

Unfolding a composite panorama of mythology, religion, art, poetry and piracy, the history of this flowering shrub, which spreads in dazzling array along its public thoroughfares, coincides with much of the background, customs and atmosphere of cosmopolitan New Orleans, with its artistic pageants, impressive religion processions, quaint, abundant St. Joseph's Day altars, picturesque patios, and lurid corsair legends. Bienville's siren city could hardly find an official flower more appropriate than the *Nerium oleander* selected when the late Mr. McShane was mayor, for, since this alluring Nereid still flaunts its charms, in the wake of his former trail, even Jean Lafitte, the pirate-hero who gauged the heart-depth and catered to the whims of proud, fastidious, old New Orleans, could not have chosen more wisely!

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## STUDIES OF THE DESTRUCTION OF MARINE FISH BY SHRIMP TRAWLERS IN LOUISIANA

(Continued from Page 24)

is none among the shrimp fishermen. They summarily destroy the following fish on all occasions when the opportunity arises: alligator gar (*Atractosteus spatula*); stingaree (*Dasyatis sabina*) and other rays; sawfish (*Pristis pectinatus*); spot-fin shark (*Carcharias limbatus*) and other sharks. An accurate estimate of the number destroyed by trawlers cannot be made but it is probably considerable. These animals, with the exception of the rays, are predacious and very destructive to other fish so that this phase of trawling is probably beneficial. Experiments to devise a wholesale method of exterminating gars by electrocuting them have been made recently in Texas (See Gowanloch (3) ). Louisiana law requires that all gars taken by anglers be killed.

### CONCLUSION

Due to the limitations of these data it is impossible to present quantitative evidence as to the destructiveness of the shrimp trawl. But the efficiency of the trawl in capturing both fish and shrimp, its wide use in commercial shrimping, the moribund condition of a large part of the catch and the large number of fish caught, lead the writer to believe that the trawl is harmful to several species of fish.

At the same time, considering the problem as a whole, it must be remembered that the value of the shrimp to the fishermen in Louisiana during 1931 and 1932 was $1,644,513.00 (Johnson and Lindner (5) and Statistical Bulletin No. 1073 (10) ) whereas at the same time the fish under discussion yielded only $170,402.00 to the fishermen (Fiedler (2) and Statistical Bulletin No. 1073 (10) ). Because of the overwhelmingly greater value of the shrimp, it is necessary that some allowance must be made in favor of the most efficient shrimping gear even though it catches other forms.

A recommendation, which, if carried out would help to alleviate the condition, is that of persuading or requiring the shrimp fishermen to separate the shrimp and fish immediately upon capture. Many fish that flop and die on a hot deck would live to swim another day if the fishermen were quick in throwing them back into the water.

### SUMMARY

1. Figures were given for all the common species of fish caught, showing their relative abundance on inside and outside waters for 1932 and 1933. The species most commonly taken in order of numbers were the croaker, star drum, anchovy, white trout, sea cat, menhaden, cutlass fish and spot.

2. Tables and graphs were presented for both total fish and commercial fish, using both actual numbers caught each month, and the averages per haul, for each month of 1932 and 1933. The data for inside and outside waters were presented in the same manner. These illustrations show that the fish population affected by trawls is greatest from late spring to early fall and is generally greatest in the gulf. The graphs also indicate that as fall approaches the numbers of fish on the inside become less and the numbers on the outside increase, apparently due to a general egress of fish from the bay to the gulf. The fall trawling season is mostly in the bay when the fish are not as numerous as they are in the summer and spring. During the spring season when a large part of the shrimping is in the gulf the numbers of fish in the area are not as high as they are in the fall.

3. Recommendations are given advising that the shrimp fishermen be persuaded or required to separate the shrimp and fish immediately upon capture and throw the latter overboard thereby decreasing their mortality.

### ACKNOWLEDGMENTS

The writer wishes to acknowledge his indebtedness to all people who have been connected in any capacity with the work on shrimp carried on in Louisiana by the Shrimp Investigations staff of the U. S. Bureau of Fisheries, and the Louisiana Department of Conservation. He is also indebted to the Department of Conservation and the Bureau of Fisheries for facilities which made this work possible. Especial thanks are due to Mr. Milton J. Lindner of the Bureau of Fisheries,

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Dr. Frank W. Weymouth, Department of Physiology, Stanford University; Mr. Forrest V. Durand, formerly of the department of Conservation, and Mr. J. Nelson Gowanloch of the Department of Conservation, all of whom have assisted in ways too numerous to mention.

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## *TO AN OLD OAK*

*Old oak, with garnitures of moss,*
*If skies be bright or dull,*
*You stand steadfast throughout the years*
*And oh, you are so beautiful!*

*The pines reach up into the sky,*
*The willows seem to be repining,*
*The maples gaily toss their leaves*
*To show their silver lining.*

*The little redbuds blush in spring,*
*The aspens quake with mirth,*
*But your strong arms spread o'er the soil*
*That cradled you at birth.*

*Life has its joyous interludes*
*When hearts are young and free,*
*But from you I have learned this truth—*
*Loyalty is heavenly!*

—GRACE TARLETON AARON.

## STATE PARKS FOR OUR STATE

(Continued from Page 11)

**Natural sand beach bordering one of the many lakes in South Louisiana.**

facilities in their outing, which is usually for only one day. This type of visitor requires careful consideration, as there is a wide variation in their attendance from day to day, the peak being on Sundays and holidays.

The second type of visitor to the State Park is the vacationist who will remain several days or even weeks. For these people it is planned to construct cabins with accommodations for light housekeeping. However, if the visitors prefer to have their meals prepared for them, they will be served at the combination or lodge building constructed for this purpose.

The last type of visitor to the State Parks is the camper. The percentage of such visitors is increasing due to the improved roads and the economical or low cost of well constructed trailers sufficient to supply all of the needs of the visitor in the form of bedding, utensils, and the like. This type of visitor in the past depended on a tent for shelter; however, it is believed that this group of visitors will become more and more numerous as trailers become better equipped and lower in price.

In closing I wish to state that if the State of Louisiana is able to acquire and develop about ten major State Parks and Recreational Centers, they will become the most highly prized and cherished possessions of the State when its population increases and becomes congested. It is the duty of the present generation to preserve at accessible and well planned places, areas of the above type so that in the future great numbers of people who cannot afford to travel will be able to see first hand and at no appreciable expense sections typical of this great State before it was overrun by the rapidly advancing mechanization of commerce and industry.

## ROBERT S. MAESTRI

(Continued from Page 3)

### Louisiana Conservation Review

Under Commissioner Maestri's authority, James P. Guillot, Executive Secretary of the Department, founded, in October, 1930, the *Louisiana Conservation Review,* a publication which has won the reputation of being one of the leading, if not the leader, of all State conservation periodicals in the country.

Published first as a monthly, it became a quarterly in July, 1932.

The *Louisiana Conservation Review* is distributed free of charge to schools, high schools, colleges, universities, libraries, professional men and to others interested in conservation. Appreciation of the Review has been expressed in manifold ways. The high regard it has won is reflected in the constant stream of highly commendatory letters received by the Department, the steadily increasing numbers of requests from institutions and citizens of Louisiana, of other states and of foreign lands to be placed on the mailing list and the numerous requests by educational institutions for files of this publication. The mailing list for the *Review* now totals over twenty-two thousand.

Primarily designed to teach conservation in practical terms, the *Review* has also served to "sell Louisiana" to citizens far and wide, bringing to a vast number of people, particularly those interested in developing Louisiana's natural riches, accurate knowledge of Louisiana's great natural resources.

The *Louisiana Conservation Review* is bound into permanent form by many educational institutions throughout the country thus taking its place in the libraries of high schools, colleges and universities.

### Enforcement

In increasing the efficiency of the patrol service, both on land and water. Reducing the general expense of this service at least one-third compared with past administrations. Placing patrolmen at strategic points in the State. Assisting the sheriffs of the several parishes, local game protectors, and federal agents.

Extensive reconditioning of the Department of Conservation fleet has been carried out and has greatly increased the effectiveness of its work. Still further funds will be necessary for this purpose. The rapid expansion of the oil industry in many fields in Louisiana has greatly increased the need of patrol services.

### Bureau of Scientific Research and Statistics

The Bureau of Scientific Research and Statistics was established by special legislation in 1930. Although at that time the sum of fifty thousand dollars was to be designated for the Bureau, no appropriation was made, and during the five and a half years the Bureau has carried on its numerous activities without any special appropriation. In spite of this handicap, the Bureau has accomplished much important work. The Bureau of Research has served as a clearing house for innumerable divisional inquiries relating to special problems.

The sea shrimp constitutes an important Louisiana industry. Fifth in volume, and sixth in value of all the United States fisheries, the shrimp industry receives from Louisiana approximately fifty percent of the total production. At the time that the Bureau of Research was created, the sea shrimp was the least understood of Louisiana marine food products. Its breeding, development and migrations were totally unknown. Acting in cooperation with the Bureau of Fisheries of the U. S. Department of Commerce, the Bureau of Research carried out and is still carrying out a carefully planned shrimp investigation which has been productive of a vast amount of information of highly practical value. As a result, instead of being the least understood of Louisiana marine commercial products, the sea shrimp has now yielded the needed information regarding its life history and habits and has become one of the best known and best understood of all our fisheries. Louisiana's preeminent position as a shrimp-producing state is now more assured since information that the shrimp investigations have yielded will enable those concerned with shrimp production to conduct their activities in accordance with the best conservation principles. The sea shrimp has been found to produce its eggs at sea, but the young stages have been found to develop in the bayous and the inshore waters. It has been found that the sea shrimp is apparently an animal of brief life the available evidence indicating that it dies at the end of a year. These and very many other facts that have been ascertained as a result of these researches make possible the proper planning of a program to conserve this highly valuable natural resource.

The Bureau of Research also conducted an investigation of the river shrimp which though greatly less important than the sea shrimp industry is nevertheless a resource of considerable value. Before these investigations the facts concerning the life of the river shrimp are almost utterly unknown.

The Bureau of Research has also conducted muskrat investigations in cooperation with the Department of Zoology of the Louisiana State University. These studies have been productive of new facts regarding this valuable fur bearing animal.

The Bureau of Research has conducted exact studies into pollution problems. These investigations have involved studies in the field and in the laboratory, and have resulted in the control and elimination of seriously damaging pollution conditions.

The Bureau of Research was given the task of investigating the alleged destruction of oysters by oil well activities in Terrebonne Parish. The Commissioner established a marine biological station at Grand Pass where these facilities were used by the Chief Biologist of the Department of Conservation in the conduct of almost a year of experimental work. This research was completely pioneer in character since at the time of its initiation absolutely nothing was known of the actual effects of oil and oil well products upon oysters. The experiment conducted by the Chief Biologist were confirmed by repeated series and produced the first accurate information ever obtained relating to the mortality of oysters as a result of oil pollution. The results obtained appeared to be at variance with the indications secured by the Bureau of Fisheries of the U. S. Department of Commerce. This apparent contradiction led at the request of the Bureau of Research to the initiation of an extensive series of investigations by officials of the Bureau of Fisheries of the U. S. Department of Commerce in Washington. The results of these extensive studies completely confirmed the findings of the Bureau of Research of the Department of Conservation and have been of extreme value in providing the basis for the proper control of oil well activities so that their development and exploitation need not damage Louisiana's valuable oyster industry.

Minerals investigations have occupied much attention and have been productive of numerous scientific reports and bulletins which have received wide commendation.

The Bureau of Research has provided forty articles for the *Louisiana Conservation Review*, some of these being monographic in character. One discussion of the subject of poisonous snakes of Louisiana, prepared by the Chief Biologist, was in such demand that it was reprinted and the reprints likewise exhausted.

The Chief Biologist of the Bureau of Research prepared a bulletin entitled "Sea Fishes and Sea Fishing in Louisiana", which went almost immediately out of print. A new treatise on the subject was prepared entitled "Fishes and Fishing in Louisiana", covering both salt water and fresh water species. This was a well illustrated volume of 638 pages with 9 colored plates, folding maps and numerous black and white illustrations. The edition of five thousand copies was rapidly exhausted and the demand for the work has been continuous.

The Bureau of Research has served as a clearing house for inquiries received by various divisions and referred to the Bureau for answer. This service which is constantly expanding has covered almost every state in the Union and many foreign lands.

The Bureau of Research conducted an extensive series of studies on Marsh Island, involving tedious field work, soil studies, of vegetation, chemical analyses and photographic records. This work was done by Dr. William L. Tower in cooperation with the Chief Biologist of the Bureau of Research and resulted in the production of a vast amount of valuable information.

The Bureau of Research has organized summaries of statistics relating to the natural resources of the State.

The Bureau of Research has brought into existence the proper study of the mineral resources of the State in the establishment of the Geological Survey created by legislative act in the Special Session of 1932. Included was a program of parish geological work, the results of which are presented in separate unit bulletins.

The Bureau of Research has conducted extensive studies of birds and other wildlife of the State in cooperation with the Bureau of Biological Survey of the U. S. Department of Agriculture and other agencies. These ornithological studies will be presented in the form of a comprehensive bulletin of which Dr. Harry Church Oberholser of the Bureau of Biological Survey, together with the Chief Biologist of the Bureau of Research, are authors.

The Bureau of Research has lacked the services of a trained chemist, but due to the excellent cooperation of the scientific staff of the State Board of Health, innumerable analyses of materials involved in pollution and other important conservation problems have been made.

### LIBRARY

During the administration of Commissioner Maestri and under the special direction of the Executive Secretary, James P. Guillot, there was founded a conservation library centralizing, for reference and research uses, the books, periodicals and other publications relating to conservation in its many aspects. This library has undergone expansion and development and will soon become an invaluable part of the Department of Conservation.

The library of the Department of Conservation in addition to books and other publications also includes a library of original motion picture films relating to the natural resources of the State. These films, the property of the Department of Conservation, represent a value of about $15,000, and are in constant service for educational purposes.

Additionally also, the library includes an excellent library of engravings and line cuts, representing a value of $15,000. These have played an invaluable part in illustrating the numerous publications of the Department of Conservation.

### FISHERIES

The establishment of fish hatcheries at an average cost of $25,000 each, and also fish and game preserves at an average cost of $75,000 each, spread over the State in naturally adapted locations.

The Department of Conservation is now operating five fish hatcheries: The James A. Noe Hatchery (Ouachita Parish); Huey P. Long Hatchery (near Slidell); Beechwood Hatchery (Forest Hill, near Alexandria); Lake Bruen Hatchery (St. Joseph); Lake St. John Hatchery (Ferriday). These hatcheries are fully equipped for the distribution of game fish throughout the streams of Louisiana. The Allen Northwest Louisiana Fish and Game Preserve is made up of three lakes—Black Lake, Clear Lake, Saline Lake—lying in the Parishes of Winn and Natchitoches. There also is a special buffalo hatchery at Lake des Allemands. These fish hatcheries have kept our inland streams, lakes and private ponds, well supplied with excellent species of game fish. Grateful acknowledgments have been received from hundreds of individuals over the State.

One remarkable feature of the fisheries resources has been the spectacular rise in the production of Louisiana crabmeat. Whereas elsewhere in the United States crabmeat production has for various reasons sharply declined, the Louisiana production of this resource has correspondingly risen. A comparison of the figures for the past four years is impressive. The total crabmeat produced in Louisiana for 1932 was 1,041,191 pounds with a value of $260,275.75. Production rose in 1933 to 1,813,508 with a value of $362,701.60. A spectacular rise follows for 1934 to 3,088,163 pounds with a value of $326,448.90 and in 1935 to a total of 5,764,115 pounds with a value of $1,729,234.50.

### OYSTERS AND WATER BOTTOMS

This division is responsible for the shell fish and water bottoms of the State, enforcing conservation regulations, and collecting revenues due the State. It has extended its activities, both in the cultivated oyster fields and the exploitation of the natural reefs. It has applied an intensive system of supervision and control, and study of oyster mortality in cooperation with the United States Bureau of Fisheries and the Department's Bureau of Research.

### WILDLIFE

Vast improvement of the wildlife preserves and sanctuaries, covering some four hundred thousand acres, placing thereon all necessary protective agencies.

Adoption of proper regulations tending to stimulate and expand the fur industry of Louisiana.

The Division of Wildlife continues its active cooperation with the State Parks Commission of Louisiana and the National Park Service of the United States Department of the Interior in establishing and constructing State parks at strategic points of the State that serve as great recreational centers for the citizens of Louisiana and tourists from other States.

### FORESTRY

In a short period, the Division of Forestry, with the cooperation of the federal government and the landowners, has been able to reorganize the division and make it one of the most efficient forestry bureaus in the Southern States.

This division has devoted much of its time in cooperating with the Civil Conservation Corps through its twenty-odd camps.

### MINERALS

The Division of Minerals has extended its activities and broadened its scope, not only in the oil and gas industry, but in all phases of industrial development which should bring to Louisiana many new industries. The mining of sulphur has made rapid strides within the past few years, developing one of the largest fields in the world. The removal of the main minerals office to New

Orleans has more completely co-ordinated the State's mineral activities with the present National activities.

The results of explorations which have continued during the past biennium have brought national attention to the remarkable rise in Louisiana's position as an oil and gas producing State.

Besides cooperating in the exploration and development under proper conservation methods of oil and gas fields, the Department has corrected a number of abuses. Under the program of "Correction of Irregularities," an abuse is eliminated by the monthly gas and oil reports. The operators are called upon to account in full for all gas and oil produced, bought, sold or exchanged.

### Louisiana Geological Survey

A move of extreme importance and value to the development of the geological resources of the State occurred in 1934 when the Commissioner inaugurated a Geological Survey of the State of Louisiana. The information that is being gathered and made available by the Geological Survey has already attracted the attention of geologists throughout the nation. The work of the Survey will greatly contribute to the expansion of activities in this field.

Such has been the progressive record of Commissioner Maestri's administration. The important executive duties for which he was there responsible have now passed to his successor, the Honorable William G. Rankin, Commissioner of Conservation of Louisiana, formerly member of the Louisiana Tax Commission.

### Conclusion

It is eminently fitting that New Orleans, originally the territory of Orleans and also the natural gateway of the vast Louisiana Purchase out of which were carved, in whole or in part, no less than thirteen states of the Union, should have at its head a former Commissioner of Conservation, a man who has served and learned and has become fully conversant and familiar with all the natural resources which are concentrated around the very city over which he exercises his executive authority. More than any other major city of the United States, New Orleans is closely surrounded by great natural riches. Fur, fisheries, oil and other minerals, aquatic and other rich resources come to her very doors, serving the entire world.

Mayor Maestri will well serve his City, his State and his Nation.

## THE LIVE OAK SOCIETY

Bulletin Number Three

Lafayette, Louisiana,
November 27, 1936.

To All Members, Their Attorneys,
and Other Interested Persons.

Dear Friends:

It is time to remit the Annual Dues. Please pick up 25 or more good acorns from the ground under each Member. Be sure they have not been attacked by *Balaninus rectus*. Send more than 25 so we may still have enough even if we have to throw out some. If you can't find as many as 25, send as many as you can. *DO IT NOW!* As Shakespeare said, "Get you gone, but do it!"

People have been inquiring as to how the last year's crop is getting along. They are particularly interested in the *"blooded stock"*—that is, the offspring of the famous old Members of the Society. Well, it is a sad story, Mates, but the answer to that inquiry is: The whole dad-blamed crop was a flop! Hank Riley followed directions. He waited until all the dues amounted to 1,000 acorns, then planted them in 10 rows of 100 each, according to the Chart on which was indicated exactly whose acorns were planted where. Then he waited and he waited and he waited—and they never did come up! He said maybe it was due to the drought, but I called his hand by noting that 500 Robert Martin acorns which I planted at the same time had all come up and were prosperous. So the only explanation we now have for this wholesale crop failure is that we kept those acorns too long in this steam-heated office, and they probably all dried out. It was a mistake to wait for all the dues to be remitted. This time we are going to plant acorns as soon as we receive them, and make the Chart in a different way. You remit me the dues, and I will hand them to Hank.

Texas is combing the plains to find a bigger live oak than our President. We now have a Member in Walterboro, South Carolina. Miss Bower Weaks, of Monroe, has remitted $5.00 to the fund for purchasing Paradise Grove. We now have only $5,950.00 more to collect At Highlands Hammock, Florida, they say they have some live oaks 800 years old. W. T. Hart took a young live oak to Prescott, Arkansas, where it is flourishing —nine years old. Mrs. Norma Emerson, of Winter Garden, Florida, wrote and told Collier's about the Live Oak Society. Bob Davis of the New York Sun enthuses in a book over Friendship Oak at Gulfport—a Member of the Society. The City Attorney of Thomasville, Georgia, P. C. Andrews, has entered "The Big Oak", municipal tree of that city (and a beauty) into the Society. Miss Rosemary Glennon, Secretary of the Mobile Historical Society, has entered the Boyington Oak of Mobile and the Jackson Oak of Daphne, Alabama. Mr. Tom Caldwell, a banker of Houston, thinks he has a bigger live oak than the President of the Society (statistics not yet received). Mrs. Pearl Guyton, of Natchez, reports on the Aaron Burr Oak and the Duncan Oaks of that place. Stanley Arthur, the learned scribe, gave us a great day at the old Versailles Plantation with the de la Ronde Oaks. Mrs. Claire Gueymard, of Baton Rouge, gave the Live Oak Society to Hollands Magazine. Doctor William McAndrew, of New York, promoted a bond issue, based on the Live Oak Society. Mrs. Mary McVea Newell, of Chattanooga, and Mrs. H. Wentworth Young, of Wentworth, Georgia, submit the Lanier Oak, of St. Simon's Island, Georgia, to the Society. Miss Florence Dymond submits her four Mandeville Oaks—Faith, Hope, Charity, and Mrs. Moriarity! Doctor Payne's oak near Napoleonville is the *Dalferes*—not the Napoleon Oak. Mrs. J. Crawford, of Biloxi, submits the Tullis Oak—20-8. My brother, the late Doctor George Stephens, sent me just before his death statistics on the Hertzog Grove, Magnolia Plantation, on Cane River. The Sunday Item-Tribune, New Orleans, of November 22, gave a full page spread to the Society, with portrait of the Locke Breaux oak, our *President*—and an interview with its Attorney, Mr. Leon Weiss, stating that a contract has been let to get the *President's* face lifted.

With cordial greetings to all Friends of the Live Oak, I am

Sincerely yours,
EDWIN L. STEPHENS,
Acting Secretary-Treasurer.

## A DISCUSSION OF THE SHRIMP TRAWL-FISH PROBLEM

(Continued from Page 17)

what species of fish were being damaged by the trawl. From the commercial standpoint a conclusion is more easily arrived at than from a sport fishing angle. With the commercial fishes it would be possible to compare the value of the fishes affected by the trawl with the value of the shrimp. From these figures it would be possible to arrive at the necessary conclusions as to whether or not it would be economically profitable to limit the trawl fishery. At the present time the shrimp is much more important than any of the commercial fishes of the South, consequently it is probably advisable that the most efficient means for capturing shrimp, the trawl, should be given some preference.

Considering sport fishing this problem is much more complex for it is difficult to arrive at any accurate estimation of the value of sport fishing to a particular area. The chief reason for this is that it is impossible to evaluate in dollars and cents the recreational value of fishing. The recreational value of sport fishing is undoubtedly more than the actual money spent in rods, reels, hooks, bait, guides, hotel bills, gasoline, etc.

Although it is impossible at this time to prove that the shrimp trawl is or is not detrimental it is undoubted that the trawl has its effect on the general ecologic make-up of the marine populations along the South Atlantic and Gulf coasts where it is used in the shrimp fishery. Just what these effects are is not known. The problem is more than the mere depletion of possibly one or more species of fishes. It is a problem of ecological and economic associations for which at this time adequate data are not available to permit an exact scientific understanding of all the effects.

## VALUABLE HANDBOOK ON LOUISIANA PURCHASING POWER

Entitled "Louisiana Purchasing Power Handbook," a volume has just been issued by Clarence Peckham Dunbar, Consulting Geologist and Petroleum Economist, Second National Bank Building, Houston, Texas.

Mr. Dunbar has gathered and analyzed data covering the essential statistics of Louisiana that form the adequate basis for estimating purchasing power. As set forth in the preface: "The purpose of this handbook is to offer in one reference volume practical, working information on markets, purchasing power, business risks, and other detailed information on trades and industries of Louisiana. The book was designed for the use of business men, advertisers, bankers, investors, retailers, wholesalers, manufacturers, public service corporations, real estate and insurance companies, and for all others who are interested in detailed information on a particular parish or the state as a whole." The data included cover a surprisingly wide variety of useful detail. The arrangement by parishes permits extremely rapid access to the desired information. The book should prove an invaluable reference to all whose business interests require a knowledge of up-to-date statistics covering the State of Louisiana, of the highly varied and intricate character necessary for the evaluation of purchasing power.

# GEOLOGICAL SURVEY

DR. H. V. HOWE, *Director,*
*School of Geology of Louisiana State University*
*and Director, Research Division, Louisiana*
*Geological Survey*

C. K. MORESI, *State Geologist,*
*Louisiana Geological Survey,*
*Department of Conservation*

## THE SULPHUR AND ASSOCIATED MINERALS OF THE CAP ROCK OF GULF COAST SALT DOMES

In April, 1935, the School of geology at Louisiana State University and the Louisiana Geological Survey jointly laid plans to carry out a study of the cap rock which is found overlying the salt of some of the salt domes of the Louisiana Gulf Coast and Interior regions, planning to stress in particular the occurrence of sulphur, which is an important cap rock mineral on a few of the domes. The decision to undertake this work was arrived at in view of the fact that the two companies at that time mining sulphur in Louisiana, the Jefferson Lake Oil Company, Iberia Parish, and the Freeport Sulphur Company, Plaquemines Parish, had submitted cap rock material for examination and had expressed a willingness to cooperate in making a study of the problems connected with the occurrence of sulphur.

A preliminary survey of the literature dealing with cap rock revealed that, although considerable has been written on the subject, very little work of a detailed nature has been done, and that the great store of information which has been accumulated during recent years as a result of the development of the oil and sulphur resources of the state, has received virtually no attention. It was agreed, therefore, that in this study, special attention should be given the more recent data, and that samples of cap rock which have become available as a result of the drilling of oil and sulphur wells should be studied in as great detail as possible. With this in mind, the study as outlined called for the analysis of as many samples of cap rock as feasible with the aid of the petrographic microscope, to be spplemented by the additional data obtainable pertaining to other phases of the geology of the cap rock.

Actual work was started by instituting a thorough search of the literature on the subject. During the latter part of April, 1935, the mining operation of the Jefferson Lake Oil Company at Jefferson Island dome was visited and some of the cap rock cores which had been obtained when drilling sulphur wells were inspected. Through the courtesy of the Jefferson Lake Oil Company the writer spent a part of June and July, 1935, observing the cutting and removal of cores of cap rock from sulphur wells which were being drilled. In addition, many well cores which had been obtained previous to this time were inspected.

In September, 1935, representative core material was selected from cap rock cores on hand and from the materials collected during the summer, and was sent away to be prepared for study with the petrographic microscope. The preparation of material for this type of study consists of cutting it into very thin chips which are then ground down until they are thin enough to transmit light when placed under the microscope. Much difficulty is encountered in preparing thin sections of cap rock containing sulphur because of the low melting point and relative softness of sulphur. Ordinary thin sections can be ground down rather rapidly and mounted in a medium such as Canada balsam without having to watch the amount of heat used so closely. If the sulphur in the sections is melted, the original relationship of the minerals can not be determined. Therefore, in order to insure obtaining the very best thin sections possible, the materials were sent to experts in this line of work in Europe.

Through the generous cooperation of the Freeport Sulphur Company, the writer was enabled to visit their mining operation at the Grand Ecaille (Lake Washington) Dome, during September, 1935, and to observe the drilling of sulphur wells at this sulphur deposit. Here additional data were accumulated, and more samples of cap rock were obtained for thin sectioning.

The writer spent the school year of 1935-1936 in the laboratory of the School of Geology at Louisiana State University studying the thin sections and working upon a phase of the problem for which it had been thought very little information would be obtained. The problem referred to is the genetic relation of the cap rock to the underlying salt stock. Samples of salt (common table salt, the mineral, halite) included in the core material collected at Jefferson Island and at Grand Ecaille were found upon solution in water to contain appreciable amounts of crystals and cleavage fragments of anhydrite (calcium sulphate). Anhydrite also makes up an important part of the cap rock and in addition has been suggested as the source, through alteration, of sulphur and other of the cap rock minerals.

In order to obtain sufficient data to ascertain the significance of the anhydrite contained in the salt, representative samples for study were collected from several other of the Louisiana salt domes. These samples were dissolved in distilled water and the weight—percentage of water—insoluble residue computed. The amount of residue present and the complexity of its mineralogical composition were found to be much greater than has been generally suspected. With regard to the minerals which are present, anhydrite constitutes all but a very small percentage of the total. But in addition to anhydrite, quartz, dolomite, calcite, carbonates composed of varying percentages of calcium and iron, pyrite, hauerite, sulphur, unidentified potash salts, and two unidentified opaque minerals have been found. All of these minerals, with the exception of the potash salts occur as well developed, microscopic crystals This mineral assemblage is characteristic of the salt of those domes sampled. The salt of four of the domes was found to contain inclusions of red sandstone, and that of several domes to contain banded aggregates of crystalline anhydrite.

The writer is at present containuing the analysis of cap rock and salt thin sections, as well as the work on salt residues, in the laboratories of the Freeport Sulphur Company at Grand Ecaille, Plaquemine Parish.

## SURVEY MAKING GEOLOGICAL INVESTIGATIONS OF WINN AND CALDWELL PARISHES

Geological field work has been in progress in the area of Winn and Caldwell Parishes since the first of June. The field party is under the immediate supervision of J. Huner, Jr., geologist, Research Division, Louisiana Geological Survey, formerly geologist for the Illinois Geological Survey. The area lies near the eastern terminus of the Angelina-Caldwell monoclinal flexure. It extends from the Red River to the Ouachita, and the surface formations are mostly of upper Eocene age, although mantled in places by younger stream deposits.

The area of Winn Parish has attracted geological attention from the days of the earliest settlements in the lower Mississippi valley. Early explorers found the Indians conducting an extensive trade in salt which they evaporated from saline springs about the borders of salt domes. These salt producing areas were early termed "salines", and it was not until recent years that the intrusive nature of the vast underlying salt deposits became known. Six of these areas, Price's, Drakes' or Goldonna, Winnfield, Coochie Brake Cedar Creek, and Sikes, have had wells drilled upon them, or in their immediate vicinity, and are recognized as salt domes. The Winnfield dome is of particular interest as it is one of the few salt domes in the Gulf Coast where the cap rock is exposed at the surface. The upper portion of the Winnfield cap rock consists largely of limestone and much of it has been mined for road metal. At the present time the Solvay Chemical Company is developing a quarry to supply its plant at Baton Rouge with lime. It is the only deposit of limestone in Louisiana which has been developed on an extensive scale commercially. The dome is likewise the only salt deposit in north Louisiana which is beind mined. The mining is accomplished by means of a shaft which has been sunk through the cap rock into the underlying salt plug.

While there are numerous references to the salt deposits of Winn Parish and to the bluffs along the western bank of the Ouachita River in Caldwell Parish, detailed maps have been published only of the areas immediately adjacent to the salt domes. However, along the southern border of the area, detailed work by the Louisiana Geological Survey on the Parishes of Catahoula, La Salle, and Grant, has been in progress for some time. A report on the geology of Catahoula and Concordia Parishes by W. D. Chawner is to appear this fall; a similar report on Grant and La Salle Parishes by H. N. Fisk is scheduled to appear in 1937.

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### COOPERATE TO PRESERVE BENCHMARKS

(EDITORIAL NOTE: The following letter reprinted from the *Engineering News-Record* presents a matter of importance to everyone interested in conserving engineering and mapping data.)

Sir—This is a plea for the cooperation of engineers in preserving benchmarks, in their own interest as well as that of profession and public.

The United States Coast and Geodetic Survey during the past 65 years has been extending lines of precise levels ("first-order" levels) throughout the country. These first-order lines are spaced at intervals of about 100 miles, while within these areas the leveling is of second-order accuracy. The leveling in the vertical control net now totals slightly over 250,000 miles of lines, with benchmarks set at intervals of several miles on the oldest work, and on the latest leveling about one mile.

This work has established well over 100,000 benchmarks, most of which are marked by properly inscribed metal tablets set in concrete posts, bridge abutments, culvert headwalls and other structures such as buildings, monuments and seawalls.

Frequently new construction or repair to existing structures makes it necessary to destroy these marks, in spite of the fact that every effort has been made to place them where they will be as permanent as possible. This bureau has no funds from which to pay field parties to go about and relocate these marks when they must be moved. The result is that, if these marks are to be preserved for the use of all engineers and surveyors who may have occasion to use them, we must depend on the cooperation of engineers and others throughout the country for assistance in their preservation.

We have worked out a routine method of handling such cases. If engineers who encounter our marks in the course of construction, repair or maintenance operations will cooperate as outlined below, the destruction of useful benchmarks will be very much reduced.

As soon as it becomes known that a mark must be moved, a letter should be sent to the Director, U. S. Coast and Geodetic Survey, Washington, D. C., attention Section of Leveling, stating the necessity for moving the mark and giving its designation. The designation consists of the letters and numbers found to have been stamped with dies on the disk. It is desirable to furnish a rubbing of the disk as well. A rubbing can be made by placing a piece of medium-weight paper over the disk and then rubbing over the paper with a hard pencil to bring out the legend cast in the disk, especially the letters and numbers stamped on it with dies.

Upon receipt of this information, this office will send out a new disk properly stamped to show that it has been reset. Necessary instructions for the establishment of the new mark and the transfer of elevation will also be sent. The proper procedure, in most cases, is to establish the new mark in a safe place nearby and transfer the elevation from the old mark to the new one by means of an engineer's level and rod. The levels should be run in duplicate to avoid the possibility of large errors, and all readings should be made to three decimal places in order to preserve the accuracy of the original elevation.

The old mark should not be disturbed until the observations involved in the transfer have been checked by the observer or the recorder. An assumed elevation for the old mark may be used in the transfer, since what we are primarily concerned with in a case of this sort is the difference in elevation between the old mark and the new one established to replace it.

After the new mark has been established and the elevation transferred to it, the old disk should be broken out and returned to this office in a franked mailing sack which will be supplied for the purpose. A complete report on the action taken, including a description of the location in which the new mark is established and a copy of the field notes involved in the transfer of elevation, should also be forwarded to this office; a

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franked envelope will be furnished for this purpose.

The cooperation which individuals and organizations may extend to this office in preserving the bench marks will be a service not only to this bureau and other government surveying organizations but to anyone who may have occasion to use the marks.

Howard S. Rappleye,
Chief, Section of Leveling,
U. S. Coast & Geodetic Survey.

Washington, D. C.,
Feb. 4, 1936.

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## Bulletin on the Geology of Catahoula and Concordia Parishes

The bulletin on the geology of Catahoula and Concordia Parishes which is being prepared by W. D. Chawner, should be ready to go to press about January 1st. Bulletin No. 7 entitled, "Louisiana Vicksburg Oligocene Ostracoda," by Dr. H. V. Howe and John Law was available on September 1st, 1936.

Catahoula and Concordia are contiguous parishes in east central Louisiana. Together they comprise an area of 1432 square miles, roughly wedge-shaped, 65 miles long by 25 to 35 miles wide; bordered by the Mississippi River on the east and the Red River on the south; by Tensas, Franklin and Caldwell Parishes on the north and by La Salle Parish on the west.

Except for the northwestern corner of Catahoula, which is hilly country (an extension of the Kisatchie Wold of Veatch), both parishes are in the Mississippi Flood Plain or Alluvial Valley. This Alluvial Valley is thoroughly covered with river sediments of recent age, probably to a depth of several hundred feet. The hill country, on the other hand, exhibits many good exposures of Tertiary rocks, including the Vicksburg which supplied the fauna described in Bulletin No. 7, and the type locality of the Catahoula formation.

Mr. Chawner spent more than four months in field work during 1935 and 1936. The majority of this time was spent in the Catahoula Hills and adjacent portions of La Salle and Caldwell Parishes, where due to a lack of topographic maps a great deal of pace traversing and barometric leveling was necessary. Bore holes were sometimes drilled to get fresh, unweathered samples of fossiliferous sediments for paleontologic study. These holes were made with an ordinary 4½-inch post hole auger. In general, however, the outcrops were comparatively fresh and abundant.

Almost all of the area is covered by topographic maps on a scale of one mile to the inch printed in the familiar "quadrangles" to form individual parts of the Topographic Atlas of the United States. They were surveyed under the direction of the Mississippi River Commission from whom copies may be secured by writing to the offices of the Commission at Vicksburg and enclosing 10 cents per copy. These maps have topographic contours at five foot vertical intervals in the Alluvial Valley, but the hill country is only partially and inaccurately contoured. Aerial photographs covering the Alluvial Valley were available at the War Department, Engineer's office at Vicksburg and a study of these together with the topographic maps brought out a number of interesting details concerning the old courses of the Mississippi and its tributaries.

Mr. Chawner was present during the drilling of several wells in this general area and the information so gained adds considerably to the value of this bulletin.

Some recent information has greatly helped to clarify the conceptions of the Danville-Rosefield section. The continental, lignitic beds lying between the Upper Danville (uppermost Jackson in Louisiana) and the Byram Marl as exposed at the railroad cut near Rosefield have been called the "Forest Hill Equivalent" in the Guidebook of the Eleventh Annual Fieldtrip of the Shreveport Geological Society (1933). They can now be definitely placed in the Vicksburg probably equivalent to the Mint Spring Marl of Mississippi. The credit for this discovery should go to Dr. H. V. Howe, who determined that a fauna cored at 185-187½ feet in a well drilled in Section 15, T. 10 N, R. 5 E, in northern Catahoula Parish was Vicksburg in age and probably equivalent to the

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Mint Springs Marl of the Mississippi section, but certainly not older. This core was taken *below* the lignitic clays and sands of the "Forest Hill Equivalent" and less than thirty feet above the first appearance of Danville fossils. Although this well is within the area of Vicksburg outcrops, and only a little over four miles southeast of the outcrops of the base of that formation, the Mint Springs faunal horizon could not be located at the surface. The continental beds occasionally show impressions of pelecypods, probably fresh water or brackish water types, but none of the surface samples of this phase yielded any marine fauna.

The important Red Bluff beds and the Forest Hill of Mississippi do not then seem to be represented at the surface in Louisiana. We must conclude that though there is no recognizable inconformity between the Vicksburg and the Jackson in Louisiana, the absence of Red Bluff represents a hiatus between the Eocene and the Oligocene.

The relation between the Vicksburg and the Catahoula in Louisiana seems to have been the subject of much conrtoversy during the last twenty years or so. Harris and Veatch and earlier, Hilgard, made the observations that the contact between the Catahoula and the Vicksburg is unconformable. Matson, however, in his paper on the "Catahoula Sandstone" (U. S. Geological Survey, Prof. Paper 98, 1917, p. 276) in discussing the formation in Louisiana says: "The correlation of the Catahoula sandstone west of the Mississippi River may be summarized by stating that in this area the Catahoula includes sandstones and clays equivalent not only to the Chattahoochee formation but also to the Vicksburg limestone, rests conformably on the Jackson formation and the Fayette sandstone and is conformably overlain by the Hattiesburg clay." How any one formation can do all of this is hard to believe. Matson concludes that the Vicksburg and the Catahoula are interbedded in the Rosefield area and that the Catahoula replaces the Vicksburg to the southwest as a phase of the Vicksburg.

Dr. Howe in his article "Tertiary Stratigraphy of Louisiana" (Bull. of Amer. Assoc. of Pet Geologists, June, 1933, p. 637) stated his belief that Harris and Veatch and Hilgard were right and that the Catahoula unconformably overlies the Vicksburg. The recent field work substantiates this opinion. There is good evidence to show that the basal member of the Catahoula formation, composed of moderately coarse sands and sandy clays, is unconformable on the Byram Marl. This basal member is quite irregular in thickness and the contact where well exposed in roadcuts two and a half miles southeast of Rosefield, is distinctly an erosional one.

The Vicksburg outcrop does thin and in fact disappears entirely from the surface in places as one goes southwestward from Rosefield, but it reappears again and again and the work which Dr. Harold Fisk is doing in La Salle and Grant Parishes shows that it can be traced almost to the Red River. The Catahoula, then, does not replace the Vicksburg as was Matson's contention, but in all cases overlies it or overlaps it, and is definitely unconformable on it.

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## SHRIMP INVESTIGATIONS

(Continued from Page 1)

of various scientific reports published both by the Department of Conservation of Louisiana, and by the Bureau of Fisheries of the United States Department of Commerce. It is sufficient here to say that the pursuit of these investigations has been most fruitful in valuable results. The sea shrimp once least known of all our commercial marine products has had the secrets of its life history displayed. The vast amount of patient and careful work that has made possible these results is known only to those intimately associated with the shrimp investigations. Thousands upon thousands of measurements, the tagging and recovery of thousands, the records of hydrographic conditions determining the presence of shrimp, all have been accumulated in an exact and orderly manner. Conservation of this immensely important natural resource, the sea shrimp, can now be placed upon the solid basis of ascertained facts.

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It also aims to develop individual humanitarianism. Even within this short time an amazing improvement has been made in the mental attitude of our young folks toward the conservation and protection of Louisiana's natural resources.

## EDITORIAL

DEAR GUARDIANS:

The other day Mr. Ambrose Daigre, our taxidermist, and I were talking about birdnests—how nearly all species of birds make nests that differ in some particular from the nests of other species—in construction, in material or in location.

Then I began to study the nests that we have here in our museum and I found them so interesting that I decided to tell you Guardians some of the curious things I found out about them.

A great deal of skill is displayed by some of our birds in their nest construction, many producing homes that are masterpieces of ingenuity, while others content themselves with nests so carelessly built that they can hardly be said to be "constructed" at all.

One of our Louisiana birds, the Baltimore oriole, hangs a beautifully woven nest on a swaying branch which is the last word in clever fabrication, while some of our terns merely make a slight depression on the beach to hold their eggs. Our State bird, the brown pelican, apparently throws a few twigs loosely together and calls it a nest, and only the pointed ends of the eggs keep them from rolling out on the ground.

Some of our birds are expert masons and fashion their nests out of clay, mud and other materials. Our phoebes and robins are examples of this type. The chimney swifts are masons, also, and use a sort of sticky saliva to fasten their nests in place.

The ovenbird (the one that calls, "Teacher, Teacher!") builds a peculiar, oven-shaped nest and our long-billed marsh hen constructs a ball-shaped house neatly woven of reed stalks, with a round entrance hole at the side.

Many hawks build their bulky rough nests of coarse sticks and place them in the tallest trees, but our marsh hawk builds his nest on the ground. Most of our owls, averse to strong light, use hollow trees for nests, but the burrowing owl makes a nest in the ground.

Our woodpeckers are master carpenters and chisel out snug homes in decaying trees, while the tiny ruby-throated hummers use the softest and finest fibers to make their little homes, the tops of which can be covered by a 50c piece.

Our chipping sparrow weaves a dainty nest and likes to add a horsehair or two as a decoration, while the crested flycatcher combines a piece of cast snake's skin with the nest material. The butcher bird likes to put its nest in a thorn tree so it can hang the little birds, lizards and mice that it kills just outside the door until it is ready to eat them.

There is one bird too lazy to build a nest—the cowbird. When the female is ready to lay an egg, she casually deposits it in some smaller bird's nest—to be hatched and cared for. Bird nests are only temporary structures, a new nest being built each year, always with patience, skill and care.

I believe that each Guardian would find much pleasure and profit in studying and collecting various nests and noting their materials, etc., and the Autumn is an ideal time for such studies.

With best wishes for all of you, dear Guardians, for a happy new school term,

**THE EDITOR.**

So many fine letters have come to my desk since our last issue:

Jonesboro, La.

DEAR EDITOR:

Please send me an application card for the Nature Guardian Club. I am eleven years old and in the fifth grade. I am greatly interested in the wild life of our State, and want to do all I can to help take care of it.

Very truly yours,

**JERALDINE CARTER.**

We are glad to welcome Jeraldine into the Club. The more the merrier!

Miss Lillian Place, from Hanna, La., writes:

I am an instructor in the 5th and 6th grades in the Hanna Grade School. We have begun a unit of work on Nature Study.

One of my pupils brought a copy of the *Louisiana Conservation Review* to class and we noticed the club, "The Louisiana Nature Guardians." Since we were studying about nature my pupils became very much interested in becoming members. I have 21 pupils in these two classes. Will you please send the necessary application blanks?

If possible, we would like to be included in your Club as soon as possible. We are very much interested.

Of course we are delighted to have such a fine group join our Club. With such an interested teacher the members are sure to do good work.

231 Pierce Street,
Lafayette, La.

DEAR EDITOR:

My pupils are all ready for their Nature Guardian work. I have been drilling them on the Pledge ever since I heard you talk at "Southwestern." They know the Pledge word for word and are very enthusiastic. They are in the 2nd grade and about all of them are 7 years old. I have 35 pupils in my room.

I thank you for the help you have given me.

Yours truly,

**(MRS.) R. M. DELANEY.**

### *BIRDS*

*Oh, what is more precious than the birds*
*Of the land and vale*
*Of the field and forest*
*Filled with majestic song so sweet?*

*Birds, so precious are they!*
*Birds, so beautiful are they!*
*A better friend never was,*
*A better singer never lived,*
*A sweeter song never sung.*

*Birds of beauty, birds of song,*
*Birds of an hundred colors,*
*Birds of every tone of Heaven's song,*
*Birds of a thousand kinds are they!*
*Birds of a thousand hills are they!*

*What did the air ever own*
*More precious than the birds so sweet!*
*Made by the Father-Glorious*
*With their love and freedom.*
*A more precious picture never painted!*

—H. B. WEILAND, JR.
Baker, La.

It's a long time since we have heard from Bayou Willie. We are glad to print his poem:

### *THE ORCHARD ORIOLE*

*He starts his day at early dawn*
*And to his Maker sings his praise.*
*He never tires from ceaseless song*
*He never turns from devious ways.*

*At eve his lullaby he sings*
*In his Creator 'vests his trust*
*He hies himself on spreading wings*
*To favorite trees at fall of dusk.*

### *BIRD TRADES*

*The swallow is a mason and underneath the eaves*
*He builds a nest and plasters it with mud and hay and leaves.*

*The woodpecker is hard at work, a carpenter is he,* *And you may hear him hammering his house high in a tree.*

*The goldfinch is a fuller, a skillful workman, he.*
*Of wool and thread he makes a nest that you would like to see.*

*The bullfinch knows and practices the basket-makers' trade,*

*See what a cradle for his young the little thing has made!*

*Of all the weavers that I know, the oriole's the best;*

*Up in the apple tree he weaves a cozy little nest.*

*Some little birds are miners, some build upon the ground,*

*And busy little tailors, too, among the birds are found.*

*The cuckoo laughs to see them work. "Not so," he says, "we do".*

*The wife and I take others' nests and live at ease—Cuckoo!"*

Last quarter we published a picture of that curious rare bird, the Whooping Crane. My little friend, Lyneille Galvani, from McComb City, Miss., saw it and writes the following poem:

### *THAT THING*

*I've watched him for the longest time;*
*I've even sat and stared;*
*But I can't just make up my mind.*
*Huh! As if I even cared.*

*I've sat and stared for hours*
*But it's of no avail.*
*That thing has got the longest neck*
*And just a little tail.*

*His legs are long and skinny,*
*His nose is awful long;*
*But that old thing just don't make sense—*
*His neck is even wrong.*

*My Mamma says he is a crane*
*And cranes live by a lake.*
*But I think God got all mixed up*
*And sent him by mistake!*

All I can say is that Lyneille should wait till she sees a Wood Stork!

## BIRD MIGRATION AT GRAND ISLE

By Ambrose Daigre,

*Departmental Taxidermist, Louisiana Department of Conservation*

Of all subjects of ornithology, migration is the most fascinating, yet the one phase about which we actually known so little. Long years ago, according to fanciful theories, many of our ancestors were led to believe that the birds spent the intervening periods in hollow trees or even in the mud at the bottom of ponds, but with the advancement of civilization and the study of our avifauna we know that birds migrate; even more than that, ornithologists actually know the routes traversed by many species and the places to which they migrate, but the thing we do not know is: "Why birds migrate."

Of course, there are theories giving an account of the beginning of migration; for instance, an accepted theory is that this country, or rather these United States and Canada, were once inhabited by non-migratory birdlife, but due to advancing ice during the glacial era the birds retreated southward and returned to the point from which they retreated, after the ice had thawed. The first shift of birdlife, according to theory established a migratory instinct in birds.

Some people contend that the necessity for food is the principal impulse for bird migration but why should the Purple Martin leave a winter retreat literally infested with insects to migrate to a country where cold rains, snow and frost are

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prevalent? Or why should ducks leave the southern marshes where duck foods are plentiful and shift to the north where the water is blanketed with ice? Certainly, it is not the absence of food that causes these birds to move.

According to the knowledge attained through the study of migration at Grand Isle and other points in the State, I contend that migration is an instinct born in the bird, an instinct that tells the bird when and where to migrate in order that it may hatch and rear its offspring in an environment of natural adaptibility.

Another keen instinct of a migratory bird is its sense of direction. Night migrants fly through dense fogs, where sight could not possibly aid them, and safely arrive at their destination without deviation from the natural course of migration. Many shore birds leave the eastern coast, bound for small islands thousands of miles out and they, too, reach the islands for which they are bound with the accuracy of a bullet.

Migratory birds include three classes: 1st, day migrants, birds which migrate only in the day time. These include the Nighthawk, Chimney Swift, Hawks and the Swallows. 2nd, birds that migrate both by day and night. These embrace the Ducks and Geese. 3rd, the great majority of the birds which seek the cover of darkness. I have noticed at Grand Isle that many of the night migrants often arrived during the day, but this was always due to northwest winds that forced them down.

Grand Isle, Louisiana, is one of the greatest points in the whole United States for studying migratory birdlife, but to make you fully understand this it is necessary that I give a description of the island and its geographical position on the map.

It is a slender strip of land approximately seven miles long, barely a mile wide in its largest width and is separated from the mainland only by Caminada Pass which rounds its western end. To the north and northeast lie Caminada and Barataria Bays. Looking southward is the Gulf of Mexico, an expanse of seven to eight hundred miles of water migration routes.

There is nothing so fascinating, nothing so interesting to an ornithologist or a student of birds, or even an ordinary lover of the outdoors as being on Grand Isle in spring when the hosts of migrants pour in from the tropics.

Here you have a perfect combination of environment and beautiful birds. After you have been on the island a few spring mornings there is something about the place that creeps under the very skin; bird song to greet the ear at dawn, magnificent live oaks, quaint little lanes arched with blooming Oleanders to appease a hungry eye.

On the entire southern side of the isle is approximately seven miles of sandy white beach upon which rolls an incessant fleecy surf, washing up crustaceans and innumerable varieties of minute marine creatures upon which the hosts of migratory shore birds replenish their flight-worn tissues. To the back of the island in the marsh are many tidal ponds. When the tide is out these are the favorite feeding haunts of the elegant nuptial plumed Snowy and American Egrets, the Little Green Heron, Greater and Lesser Yellowlegs, Solitary Sandpipers, Louisiana Herons and Clapper Rails.

The central portion of the island from a distance stands out on the horizon, with all the appearances of a small live oak forest. This, no doubt, is a splendid attraction to migratory insectivorious birds.

Geographically, Grand Isle is located in the direct path of the densest and most traveled routes of the migration airways. Birds which are seldom or never seen at any other points in Louisiana stop at Grand Isle for recuperation.

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Among these we might mention the beautiful Rose-breasted Grosbeak, the modest White-winged Dove, the little Black-throated Blue Warbler. I have observed on the island in April and May, practically every species of Warbler transient or resident in this State. Just during the month of April of 1936, I have sight and collecting records of the Prothonotary, the Blackburnian, Sycamore,Black-poll, Black and White, Maryland Yellow-throat, Myrtle, Parula, Palm, Worm-eating, Hooded, Golden-winged, Ovenbird, Tennessee, Redstart, Yellow Warbler, Blue-winged, Cerulean, Chestnut-sided, Bay-breasted, Black-throated Blue and many others. Among other migrants of interest we might mention the Worm-eating, Hooded, Golden-winged, Oven-bird, any considerable numbers appeared with a northwest wind April 23. On April 28, another "northwester" occurred which forced down hundreds of these Grosbeaks.

According to what I could ascertain from four years' Spring observations on the island there are three reasons governing the stopping of migrants at this point. The principal reason must be the natural attraction of the environment, secondly many birds have to stop from exhaustion. Grand Isle presents an ideal place for recuperation to any species of bird, whether it is a Black-bellied Plover or the tiny little Ruby-throated Hummingbird. All can find food, and an environment of natural adaptability. The third reason which no doubt is a very important one, is the occurrence of northwest winds in Spring at close intervals. I have noticed that very few migrants stop of their own accord when weather conditions are favorable for migration but as soon as a dark cloud appears on the horizon accompanied by a strong northwest wind, thousands of migrants drop from the sky like so many leaves. Green Herons and birds of similar size literally fall with all the appearance of shot or winged birds.

The first migrants that arrive due to northwest winds linger for several days, but as the migration period grows late these birds are off with the change of the wind.

Should anyone be interested in the arrival and departure dates of the migrants to Grand Isle, I would be very happy to furnish them with these data. To those who might be interested in rare or new records taken on the island, it might be well to report a record of a male Groove-billed Ani, April 23, 1935, which was the fifth official record for Louisiana. On April 20 of this Spring, 1936, I was very fortunate in obtaining the most eastern record and only record for Louisiana of the Golden-crowned Sparrow. I also took a record of a White-winged Dove, a southern species, on this Spring's expedition, April 12. From these rare records you can easily understand that possibly any migratory bird, taking the migration route by way of the Gulf of Mexico may on rare occasions be found on this island.

Should I be fortunate in this great work—great work to me, I assure you—and should you chance to be on Grand Isle next Spring, you will find me in one of those quaint little island cottages, sitting at a table mounting birds, and if you are interested like many other visitors to the island, there are chances you will be around to see my collection and chat on this great work, ornithology.

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## THREE-CORNERED HOPPER OR ALFALFA GIRDLER

By C. O. Eddy, *Entomologist*
*Louisiana Agricultural Experiment Station,*
*Baton Rouge*

In the July 1935 issue of the *Louisiana Conservation Review,* Dr. Thos. E. Snyder presents a good article on injury caused to black locust seedlings in the Soil Conservation Service Nurseries by the three-cornered tree hopper, also known as the alfalfa girdler. Because calls for suggestions for control of the pest have continued to come from these nurseries, it is the purpose of this article to give a poison control that has been developed in a project of the Louisiana Agricultural Experiment Station on the biology and control of the pest on alfalfa. Results of the tests have been given to some of the nurseries in letters. The poison combination is being made by some of the insecticide companies in Louisiana.

Dr. Snyder described the injury on black locust seedlings. On alfalfa the pest actually girdles the plants (thus the name alfalfa girdler), just above the soil level, leaving bands of dry dead tissue around the stems. Plants turn yellow and die and as a result stands of alfalfa are of short duration. The brown, inactive nymphs are always found just above the ground level on the base of the long stems, on the crown of the plant, or even below it. Here, too, the eggs are laid in the tissues of the plant by the triangular-shaped green adults. The adults feed in the same area, but also on the higher stalk and leaves. Dead spots are left on the stem and leaves following their feeding. Adults migrate from field to field.

Other plants found to be hosts for all stages of the pest in Louisiana during 1936 are white clover and tomatoes. They were rarely found on other plants.

In the poison studies, dozens and dozens of poisons were tested. Of them the best control was secured by a dust of—

| | |
|---|---|
| Fresh pyrethrum powder.... | 1 part by weight |
| Dusting sulfur ............. | 1 part by weight |
| Dusting talc................ | 2 parts by weight |

To secure good control, in the experiments at Baton Rouge, it was found necessary to apply the dust at sundown. At this time the air was still and a good application of dust could be made with maximum effectiveness and minimum loss from drift of the dust from the treated field. When applied at sundown the dust was exposed for the maximum time before being subjected to the destructive rays of the hot sun, which destroy the effect of pyrethrum.

Experiments have shown that two dusts should be applied to alfalfa after each cutting until the pest is under control: (1) the first one immediately after the crop is removed and (2) the second ten days later. A more detailed report will be made later.

From small plot tests, it seems that from 8 to 12 pounds of dust per acre will be required as a minimum dosage. This combination has also been found useful for the control of certain leafhoppers, also pests of nursery seedlings and alfalfa.

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## CREOLES AND PELICANS

(Continued from Page 25)

fined to the French, and also that only the descendants of emigrants from the European countries who settled in Louisiana while it was a colony of France or Spain are really entitled to be called Creoles. Those Louisianians whose forbears came to Louisiana at any time after the Purchase, in 1803, though it may have been a hundred years ago, are no more entitled to be called Creoles than are the children of emigrants who landed in New Orleans yesterday.

In 1813, soon after becoming a state, Louisiana began to use the pelican on the state seal and since that time has, in many ways, officially honored this strange, great bird.

After the adoption of the pelican as a symbol, Louisiana was given another "popular" name—"Pelican State"—and her citizens since that time have been called "Pelicans".

A very small percentage of the citizens of Louisiana can qualify as "Creoles" but all Louisiana Creoles may be called "Pelicans", so the popular name, "Pelican State" seems more fitting than "Creole State" for the Louisiana of today. Since the pelican, as a symbol, represents all native inhabitants of Louisiana, it was the inspiration for the title of this column. The suffix was added to the word "Pelican" and "Pelicana" came into being. "Pelicana" is intended, in a broad sense, to mean "belonging to, or pertaining to, a Pelican"—a "Pelican", being, of course, a Louisianian.

—*The Bunkie Record, Bunkie, La.*

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## STATE SERVICE REQUESTED

Lady on the telephone: "Is this the State Game Warden?"

State Game Warden: "Yes, madam, this is the State Game Warden.

Lady on the telephone: "Well, State Game Warden, I sure would appreciate it if you would tell me some games for my little Johnny's birthday party."

## *THE FAITHFUL DOG*

*I've hunted the woodland and hill*
*And "pointed" the quail in my day,*
*I could freeze as rigid and still*
*As a stone—when scent blew my way.*

*I recall the time you lost me*
*And I "pointed" the long hours through—*
*Though the night was too dark to see,*
*You came, as I knew you would do.*

*You gave me a pat in the darkness*
*And your voice was roughened and gruff—*
*But I knew by that one caress*
*That you understood well enough.*

*I'm just a dog but I love you*
*And though I am stiffened and old—*
*My heart is as brave and as true,*
*My spirit still dauntless and bold.*

*I know that my hunting is done*
*I no longer gambol and bark—*
*But this one desire I have won,*
*Your hand on my head—in the dark!*

*—Margaret N. Martin, in Dog World.*

## LIFE SAVED BY CAST

Squareshooter R. E. H. sent in a clipping which described how expert casting on the part of Joseph Girraci, Hartford, Connecticut, saved a life, recently, when he noticed the half-submerged body of a woman floating in the water near where he was fishing. He cast, hooked the woman's clothes and drew her to shore, where she was revived by artificial respiration. She had fallen in several hundred yards above and floated down stream.

The woman whose life was saved is fortunate that a fisherman—and a good caster—was present at the time.

*—Field and Stream.*

## NICE FOSTER CHILDREN

Juneau, Wisconsin-Joe Kastenmeier's cat went into the woods and returned nursing six baby skunks. He welcomed the aid of the conservation department in getting the little animals back to where they belonged but the cat returned them to the house.

—WISCONSIN CONSERVATION BULLETIN.

## PINTAIL'S AGE RECORD BROKEN BY FISH HAWK

An old-age record for banded wild birds in this country set by a pintail duck, which lived 13 years, has been broken by an osprey, or fish hawk. Records of the Bureau of Biological Survey of the United States Department of Agriculture show the hawk—banded when a fledgling—lived 21 years.

It was banded in June 1914 on Gardiner's Island near the eastern end of Long Island, New York, by H. H. Cleaves, Staten Island, N. Y., and found dead there last summer. It probably returned and nested annually in the vicinity of the island. Another fish hawk banded by Cleaves at the same place 4 days earlier might have lived just as long, but it was killed in 1930 at West Durham, N. C.

The pintail duck which set the previous record for longevity was killed in October 1926 near Brawley in the Imperial Valley of California. It was at least a year old when banded in the marshes that are now the Bear River Migratory Bird Refuge in Utah.

"Reports of banded ducks living more than 4 or 5 years and banded hawks living more than 2 or 3 years are unusual," says F. C. Lincoln. "Many of these do well to live a year, because of hunters."

Thousands of birds banded annually in this country enable the Bureau to accumulate valuable information on their habits, length of life, and migrations. Under the Migratory Bird Treaty Act, a Federal permit is required to band birds.

## *MEADOW LARKS*

*Who can describe it? Who has the words*
*For the liquid whistle of meadow birds*
*Lifting up from the clover or stubble?*
*I have searched for a word as thin as a bubble,*
*For a word as sparklng as a fountain,*
*Or clear as an echo against a mountain . . .*
*And I cannot find them. I only know*
*That suddenly sweet from the valley below*
*There comes a sound like rain after drouth,*
*As cool as iced drink to a thirsty mouth,*
*With the wildness and tang of a mountain cherry,*
*As sweet as the scent of a meadow berry—*
*But oh, there is nothing anywhere*
*To describe that whistle upon the air!*

—GRACE NELL CROWELL
In "The Progressive Farmer".

# Brighter Future Ahead for Sugar Bowl Classic

## *New Stadium Now Being Constructed Will Seat 70,000 People*

### *Strategically Located in 1,200 Acre City Park, New Orleans*

"WHAT is the history of the Sugar Bowl Football Classic—how and when did it begin and what is its purpose?"

The Sugar Bowl is especially a matter of immediate and general interest because of the announcement by Mayor Robert S. Maestri and Governor Richard W. Leche of revised plans for the new stadium now under construction in City Park, New Orleans. Providing a seating capacity for 70,000 people, this stadium will be strategically located in the beautiful 1,200 acre City Park at New Orleans. One important feature of the new stadium will be the provision of completely adequate parking facilities, which convenience will certainly be deeply appreciated by the public.

The coming Sugar Bowl classic will mark the third anniversary.

It was originated by a group of civic-minded football-loving New Orleanians for the purpose of bringing to the South's greatest city the outstanding football teams of the nation in a post-season game annually.

The name Sugar Bowl was adopted because New Orleans is in the heart of Louisiana's world famous Sugar Bowl section. The stadium in which the Tigers and Broncos will play on New Year's day is erected on the site of one of Louisiana first sugar cane plantations.

Sponsors of the game organized under the title of New Orleans Mid Winter Sports Association, for their plans called for a program of all popular sports with the football classic as the highlight.

The Southeastern Conference and the Southwest Conference gave official approval to the project though neither organization has any connection with the promotion of the classic.

**GUY MILNER**
**Halfback**
**Louisiana State University**

The New Orleans Mid Winter Sports Association has complete charge of all details of the Sugar Bowl classic.

It is a civic, non-profit organization. The constitution provides that no officer or member shall be paid or receive any remuneration or financial advantage because of his membership.

Also that profits, if any, after sufficient surplus accrued to insure one further annual game, shall be devoted to charity or civic projects through recognized charitable, educational, religious or governmental agencies.

The football classic is the major activity but a tennis tournament, inter-city boxing tournament, yacht and rowing races, track and field meet, basketball game, cross-country run, and golf tournament are popular features of the program.

Receipts of the football game are divided on a basis of 40 per cent to each team and 20 per cent to the sponsor organization. Each of the participating teams in the third annual classic will get approximately $40,000.

The first Sugar Bowl game was played by Tulane and Temple, and a sensational game resulted. The Owls, led by Dave Smuckler, got off to a 14 to 0 lead but the Wave had "Little Monk" Simons and rallied to win, 20 to 14.

The second game brought the Tigers of Louisiana State, Southeastern Conference champions, into the bowl with the Horned Frogs of Texas Christian as their opponents. The Frogs had the great Sammy Baugh to punt and pass sensationally, and won by the unusual score of 3 to 2.

L. S. U. returns—again Southeastern champion and unbeaten—to the Sugar Bowl on January 1, 1937. This time Santa Clara is the Tigers' foe.

The game will determine the national championship. It is the greatest intersectional post-season game ever offered the fans of the nation.

Santa Clara, barred from the Rose Bowl, and L. S. U., ignored "because", as Bill Spaulding, U. C. L. A. said, "they're too tough for Washington," will establish the Sugar Bowl game as THE post-season CLASSIC.

The present officers of the New Orleans Mid Winter Sports Association are Joseph M. Cousins, president; Herbert A. Benson, vice-president; Francis D. Reilly, secretary; J. H. Bodenheimer, treasurer; Dr. Fred Wolfe, chairman of the executive committee; Warren V. Miller, Abe Goldberg, Harry Fletcher, Sam Corenswet, Irwin Poche and Albert Wachenheim, Jr.

Organizations represented in the association include Big Ten Alumni, Citizens Committee, Co-operative Club, Knights of Columbus, Colonial Country Club, Lions Club, Association of Commerce, N. O. Athletic Club, N. O. Golf Association, N. O. Insurance Exchange, N. O. Item-Tribune, Orleans Parish Medical Society, Passenger Club, Prep School Athletic League, Retail Merchants Bureau, Rotary Club, Southern A. A. U., Traffic Club, Young Men's Business Club, Young Men's Hebrew Association, Young Men's Christian Association.

**NELLO FALASCHI**
**Captain**
**Santa Clara**

Warren V. Miller was one of the original organizers and served as president for the first two years. He now serves as legal adviser and executive committee member.

Others in the group that started the Sugar Bowl classic on its way to national fame were Joseph M. Cousins, president, Dr. M. P. Boebinger, Francis Reilly, Dr. Fred Wolfe, Semmes Rantlett, Ralph Barry and Fred Digby.

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BEARS: November 1 to January 1 - 1 Daily; 5 Season
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### *MIGRATORY GAME BIRDS*

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| GEESE: | November 26 to December 25 - | " | " | 4 | " |
| SNIPE: | November 26 to December 25 - | " | " | 15 | " |
| DOVES: | November 20 to January 31 - | " | " | 15 | " |

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